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AWARDS

Australian PC Buyer
November, The Dell Dimension
L500c was rated #1 in the Value
Desktop Category.
December, The Dell Dimension L500c
was rated #1 in the Business
PC category.

Australian PC World
Best Buy category.
January 2000 - Dell Dimension XPS
T700 was rated second in
"Best Home and Business PC".
January 2000 - Dell Dimension L500c
was ranked second in
"Best Business PC Buy".
May 2000 - Dell Dimension L500c
Voted #1 in "Best Buy under \$2000"

Top products of 1999
The Dell Dimension XPS T500
was rated The Best Home PC of 1999
by the editor and readers alike.

Australian PC Authority
T550 - won a "Recommended Award".
December, The Dell Dimension T550
won a "Recommended Award".
January 2000 - Dell Dimension XPS
T550 was named "Ultimate PC".
February 2000 - Dell Dimension XPS
T550 received the recommended
award for the ninth month in a row.
February 2000 - Dell Inspiron 3700
awarded Excellence Award.
March 2000 - Dell Dimension XPS
E730 received the speed award in the
Super PCs category.
May 2000 - Dell Inspiron 5000 named
fastest notebook on "A" list.

Internet.au
April 2000 - rated the Dell Latitude LS
as top of its "Hot Products" section.

Australian Personal Computer
December, The Dell Dimension
T500 won "Editors Choice Award".
April 2000 - Dell Dimension XPS B800R
won Editors Choice Award.

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- Microsoft® OEM Works Suite 2000
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Dell Dimension™ T Series photographed with options:
17" flat panel monitor and Altec Lansing ADA 880 speakers.



Dell Inspiron™ 5000



Dell Precision™ 220 pictured with
optional 17" flat panel monitor



Dell PowerEdge™ 2400 Server

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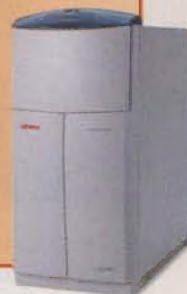
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40X CD-ROM Drive⁶
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Norton AntiVirus v5.0
S710 17" Colour Monitor
3 year warranty³

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Intel® Pentium® III Processor 850MHz

128MB, 100MHz, SDRAM
nVIDIA GeForce 256 32MB AGP Graphics
20GB⁴ Ultra ATA Hard Drive⁵
Internal DVD-ROM (10x/40x) Drive⁶
Creative SoundBlaster AudioPCI 128V
Altec Lansing ACS233
(2 speakers & subwoofer)
Compaq Fast Ethernet NIC 10/100
Compaq Internet Keyboard
Microsoft® Windows® 98 Second Edition
Microsoft® Office 2000 SBE
Norton AntiVirus v5.0
S710 17" Colour Monitor
3 year warranty³

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CD-Rewritable –

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Hardware Service –

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Desktop Hardware Installation & Internet Start-up –

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EDITORIAL



The killer app

So far, the industry has managed to produce compelling applications that drive consumers to buy more memory and faster processors. Nevertheless, right now, we're still figuring out what to do with our spanking new 1GHz processors. There's always a need for more power in servers and workstations, of course, but in consumer desktops?

It has become abundantly clear that the only things really driving sales of high-end systems in the consumer space are video and 3D graphics. That and people's apparently compulsive need to have the latest and greatest. From a functional standpoint, the difference between a 1GHz Pentium III and a 500MHz Celeron when running most office and Internet applications is negligible.

The real PC performance battleground is a subsystem most people consider somewhat esoteric — the graphics chip. If you think the advances made by Intel and AMD recently are impressive, then you should look at what the developers of 3D graphics chips are doing. The current performance leader, nVidia, has maintained a gruelling schedule of releasing a new chip every six months, and each successive processor has added at least 50% to the performance of the previous chip.

The biggest advance made by nVidia is the integration of functions into the chip that are normally executed by the system processor, which has lifted a heavy burden from the CPU.

The upshot of this is that Intel and AMD may find their higher-end, more profitable products stalling towards the end of this year, especially if they continue to charge very high premiums for them. At home, I have an Athlon 600MHz system, and the only thing that tests the system is graphics. I would get more benefit out of upgrading it to a GeForce2 than by exchanging the processor for a 1GHz CPU.

Intel and AMD do have the marketing-driven world of PC sales on their side, where it's still the case that the speed of the main CPU is the defining feature of a PC. For most buyers, the graphics chip, hard disk speed and memory are too obscure to warrant attention. That's why a lot of PC vendors put in a fast processor, then fill the rest of the PC with cheap crud. They know that most buyers are not savvy enough to spot the difference.

I wonder whether people are getting more intelligent about their computer purchases, or less so? A lot of new users, lured by the Internet, don't have much inclination to understand or analyse the hardware they're using, and will accept whatever the PC vendors tell them. I hope they turn to knowledgeable friends, computer magazines or the Internet to research ways they can get the best bang for their buck.

My point is, don't ignore the finer points of PC purchases. APC features like our video card review on page 98 will help you ensure you're not getting candy coloured boxes of fluff, or PCs with big numbers but no real punch.

Nathan Taylor

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COVER STORY

OPERATING SYSTEMS

PLATFORM
GAMES

Within the next six months, all three of the major desktop operating systems will be overhauled. Will Linux or Mac OS finally break Microsoft's seemingly unshakable hold, or will Windows triumph again?



FEATURES



SERVICE AND RELIABILITY SURVEY 2000

More than 700 respondents completed the APC Service and Reliability Survey 2000, which posed many questions about APC readers' PCs and peripherals. This month, we publish the results.

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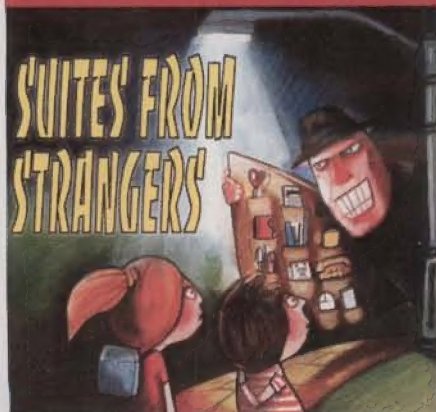
NET CENSORSHIP

BURNING THE CENSORS

Six months after the government introduced its controversial online censorship act, the ABA has not even made a dent in the availability of illegal material on the Internet. Will the act ever pick up steam?



REVIEWS



ONLINE OFFICE SUITES

The development of Web-based applications for word processing and file storage is threatening Microsoft Office. APC takes a look at the advantages and disadvantages of online office suites.

Editor's Choice

94

Products reviewed:
FreeDesk
NuoMedia
ThinkFree Office

MyFreeOffice
Desktop.com
Visto.com
Zkey

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VIDEO CARDS

The third dimension

It's no longer enough to just have a fast chip in your video card; it has to be packed with RAM. If you're after a new 3D video card, get the low-down from our roundup of the latest and greatest.

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Products reviewed:
Asus AGP-V6600 Pro64
Asus AGP-V7700



Creative Labs 3D Blaster GeForce2 GTS
Diamond Viper II
Matrox Marvel G400-TV
Leadtek WinFast GeForce256

98

AUDIO TOOLS

Face the Music

It's only the last year or so that computer audio has become powerful enough to be taken seriously by professional musicians and studio engineers. It's also becoming affordable enough for non-professionals to use. Take a peek at what's out there for the budding digital musician.

Editor's Choice	111
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Products reviewed:

Audio editors

GoldWave 4.16
HiSoft SoundProbe 1.4
Sonic Foundry Sound Forge XP 4.5
Syntrillium Cool Edit 2000



Wave sequencers

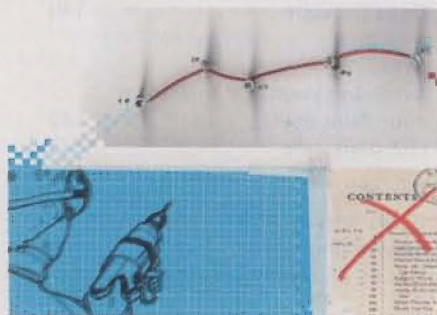
Acid DJ 2.0d
d-lusion DrumStation 1.08
FruityLoops 2.54
Masterbits masterBEAT 2.1

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MULTIMEDIA SOFTWARE

The nuts and bolts of multimedia

Multimedia authoring software is the key to developing your own applications. Make your own games, build your own tutorials or use it to spruce up your Web site.



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Products reviewed:

HyperStudio 3.1
IMSI Multimedia Fusion
Intelamedia Dazzler Deluxe
Macromedia Director 8 Shockwave Studio

Macromedia Flash 4/Freehand 9 Studio
Scala Infochannel Designer
Swish 1.0
Tribeworks iShell 1.2

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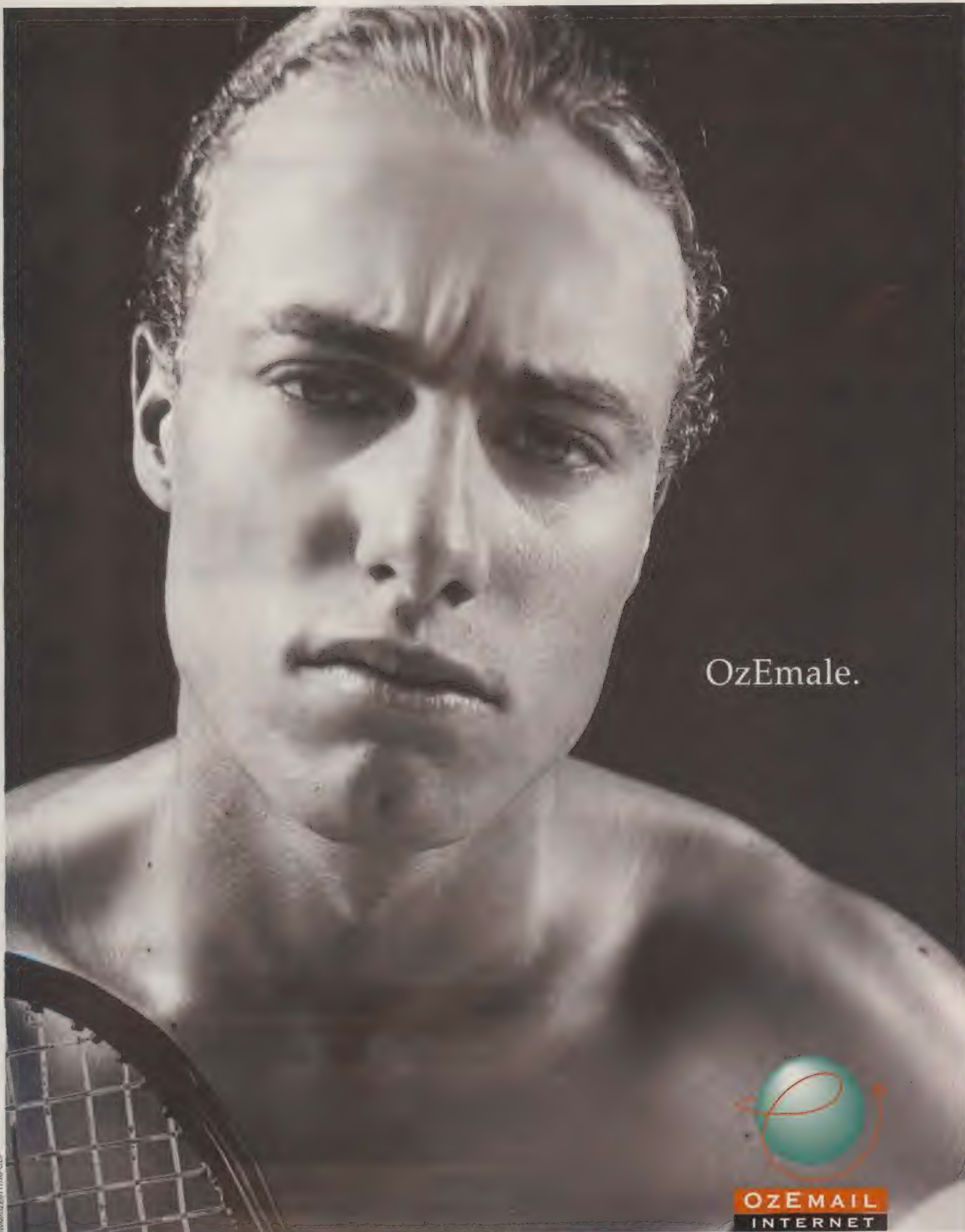
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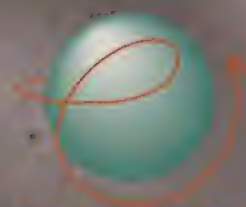
IT came from cyberspace	200
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AUSTRALIA'S FAVOURITE

What's hot on APC July CDs

FULL VERSION RED HAT LINUX, BEOS 5 PERSONAL EDITION AND OS/2 WARP 4. RETAIL VALUE OVER \$400.

Red Hat Linux 6.2

Red Hat Linux 6.2 is the latest version of the popular Linux distribution, incorporating the most recent kernel and application updates along with the easiest install yet. Not only have we included the full set of packages on CD 3, we have also updated the OS with the latest fixes and Red Hat Errata.

Linux users can also take advantage of the full version of StarOffice for Linux, included on CD 2.

See the cover booklet for help with installing and using Red Hat Linux 6.2.

OS/2 Warp 4

An OS that was once set to take the computer world by storm, OS/2 never received the market share it deserved. It is

still around, however, and now you can get it for free from CD 2. The cover booklet provides details on setting up and making the most of the OS.

Accompanying OS/2 Warp 4 on CD 2 you will find StarOffice 5.1a for OS/2 and shareware including: AntiViral Toolkit Pro for OS/2 3.0.133, Zip Control, The Graham Utilities for OS/2, Filestar/2 2.10d1 and Embellish 2.01

BeOS 5 Personal Edition

BeOS 5 Personal Edition is a true multimedia operating system that has a range of applications built in. Features include a integrated Web browser, email client, media player, TV viewer, contact manager, graphical archive extractor and 3D audio mixer. You can find BeOS 5 Personal Edition on CD 2.

Audio tools

For the burgeoning musician, CD 1 includes a selection of wave sequencers and audio editing tools for you to play, manipulate and create music. Turn to page 106 for a complete review on the software featured on the CD. Includes: DrumStation 1.08, FruityLoops Basic 2.5, MasterBeat 2.0, Sonic Foundry Acid 2.0 Build 61, Cool Edit 2000, GoldWave 4.16, Sonic Foundry Sound Forge XP 4.5 and Soundprobe 1.4



More software on CD 1 NEW AND HOT

WINDOWS

AntiLove 1.1, Audiotools 3.0, Bio-Rhythms (32 bit) 2.05, Code-Genie 2.4, Custom StartUp 1.21, Cyber-Info Webmail Notify 4.0, DataExpress, DJ 2000 1.2.6, EnZip 3.0 Beta 4, Fast Plans 6.2, GrooveMaker 2.0, HearMe for ICQ 1.02, ICQ 2000a Beta 4.30 Build 3141, iTrafficSeeker Pro 3.66, LBugMP3 1.0, Mortgage Wizard Plus (32 bit) 6.0, NetRest

1.2.11, RegBack 3.4, ShareExpress 2000 3.0.2, TransSoft FTP Control 4.1, Ulead Photo Explorer 6.0, WS_Ping ProPack 2.2

MAC

AMP Radio 1.6.5, AOL Instant Messenger 4.0.989, Apple ColorSync 3.0.1, Audicorder 1.9.1, Freeway 3.0, GrooveMaker 2.0, Help 2.5.3, Live SlideShow Beta 7, MacDoppler 3.9.8, MacMedic 2.0.3, MP3 Rage 2.0.1, NCSA Telnet 3.0a14, Program Switcher 5.1, Virex Virus Update May 2000, Vocab 1.7.2, Work Faker 1.5.1

LINUX

August 0.53, Balsa 0.8.0, EasyTAG 0.5, fancylogin 0.99.6b, Getleft 0.8.4, GnomeRAR 0.3.7, Linux 2.3.99 Prerelease 8, Moon Tool 1.0, Nessus 1.0.0, TiK 0.86

PALM OS

Ancient Red 1.31, Documents To Go 2.004, HanDBase 2.1, PalmToolBox 1.0, Snap Memo 1.0.0

EPOC/PSION

Converti 5.03, NightClock 1.10,

Your guide to the cover CDs



apcmag.cd complements both the magazine and **apcmag.com**. Each month's disc collection features software related to articles in that issue, as well as special CD-only features and the latest Web browsers, OS patches and popular tools.

Each piece of software includes instructions on whether you will need to unzip the file before installing it, and most also include README files. A complete list of software included on this month's discs is included on the CD cover.

apcmag.cd has been created in HTML. You do not need any special software to access the discs, other than a standard browser.

The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

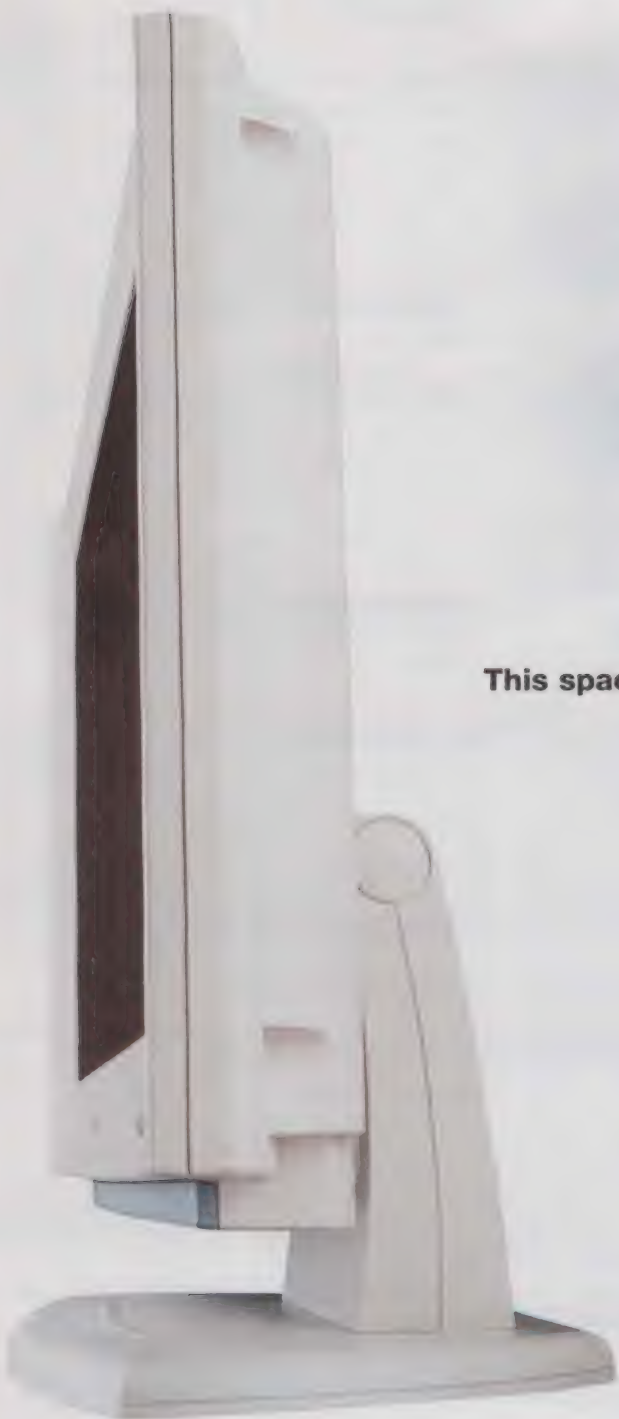
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You should carefully read the licensing agreements and honour any evaluation or shareware terms specified, read all instructions and README files, and virus-check every program before use.

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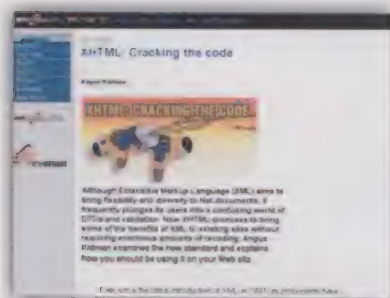
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What's on the **apcmag.com** family of sites

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<http://apcmag.com/>

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Newswire

<http://newswire.com.au/>

APC's Newswire service offers the most comprehensive online technology news coverage in Australia. **Newswire** is the only 100% local IT news service, and is updated continuously throughout each business day.



Coming up next month

In print, we look at the controversial topic of nanotechnology: what it is, how it works, and how it will change our world. We examine the growing divide between the technology haves and have-nots in Australia. **APC** also investigates the plans for future processors, looking at Intel, AMD and other manufacturers' roadmaps for the next few years.

The issue also features reviews of PCs under \$1,500, removable storage solutions, biometric hardware, and Web authoring tools. We show you how to run your Windows applications under Linux.

Plus there are the regular goodies, including First Takes, games and book reviews, as well as news, Workshop and a lot more in **APC** August, on sale July 19.

Conditions of entry

These conditions apply to all competitions in **APC** July, unless specific conditions are provided with the competition. Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in **APC** July. Entry is free and open to all residents of Australia other than employees of **ACP Publishing Pty Ltd** (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies. The contests close last mail July 18. Enter according to the instructions supplied with the individual competitions. The judges' decision is final and no correspondence will be entered into. No responsibility is accepted for late, lost or misdirected entries. All entries become the property of **ACP Publishing Pty Limited**, the promoter, 54 Park Street, Sydney

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Subscription promotion (page 96)

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PhoneManPro 2.58F, Portfolio 5.11,
YFH Subst 1.0

WINDOWS CE

ActiveSync 3.1, Bill Organizer 2.0, Jcalc 3.1,
KeyStrokeCE 1.0, T-Plus Bridge 1.0

GAMEZONE

Final Fantasy 8, Majesty: Sovereign of
Ardania

WORKSHOP

Window: Complete Cleanup 4.22,
Motherboard Monitor Version 4 4.17,
NimbleFingers Personal Edition 2.0.7, Stella
2000 4.80, WorldTime 5.5.2.748

OS/2: AntiViral Toolkit Pro for OS/2
3.0.133, ThunderByte Anti-Virus, Panda
Antivirus OS/2 6.0, McAfee VirusScan for
OS/2 3.17, TSoft Bug Killer 3.0

Mac: DarkSide of the Macintosh 5.0.6,
Synchronize 3.9, SoundJam MP Free 2.0.2,

AutoCat 2.7, Font Gander Pro 1.6,
Eradicator 1.2.1

Linux: XMMS, RealPlayer 7, grip,
NotLame, BladeEnc, grip

PDAs: Palm OS: Big Clock, BrainForest
Mobile, Converter, Solitaire, MsgAgent,
Top Gun Postman, PaPi-Mail,
One-Touch Mail

Windows CE/Pocket CE: Calligrapher,
HPC Notes

AFTER HOURS

Random Notes

The 5000 Fingers of Dr T: 'Elastic Scissors',
'The Beat Squishing Factory';
Grey Area: 'Twisted Sister', 'Sombre';
Organarchy: 'Free Oh Free', 'Stand Up';
Spinwarp: 'The Dantian', 'The Awakening';
Synetik: 'Bounty Hunter Chase',
'Biotechnology'

Internet Toolkit

Adobe Acrobat Reader 4.05, Eudora Pro
4.3.1, Free Agent 1.21, GoZilla 3.5, mIRC
5.71, RealPlayer 7.0, WinZip 8.0,
WS_FTP LE 5.08

Browsers

Microsoft Internet Explorer (32 bit) 5.01,
Netscape Communicator 4.73

More software on CD 2

HPFS drivers for other platforms

HPFS/NT, iHPFS for DOS, iHPFS for Linux,
HPFS for FreeBSD/OS/2

BeOS

ReadMe.txt, BeOS 5 Development
ToolsBeOS, BeOS shareware, Gobe
Productive 2.0, Quake II 3.20, online
resources for BeOS

Browsers

Netscape Communicator 4.61 for OS/2 Warp

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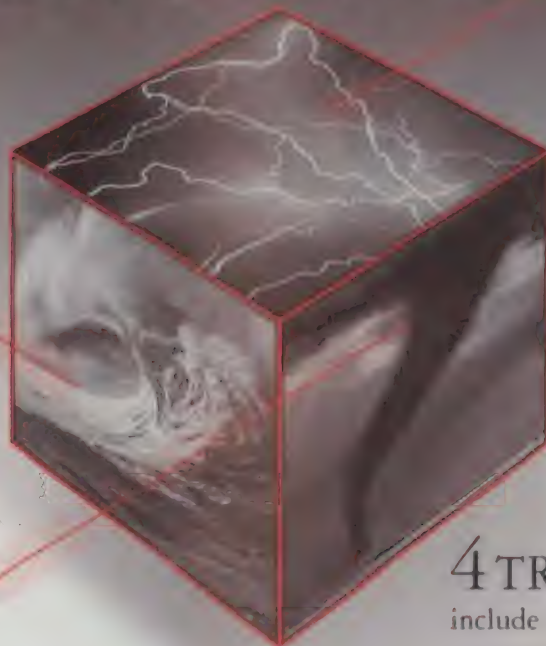


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SEX SELLS

Online adult industry steams up

Online retailer Adult-Shop.com has been busy strengthening its stranglehold on the local adult industry in anticipation of the launch of rival SharonAusten.com.

An Australian company backed by one of Europe's biggest adult retailers, Sharon Austen has made no secret of its intention to challenge Adult-Shop's dominance of the local online erotic retail industry.



However, founder Sharon Austen Dunne believes the two companies are targeted at different niches. "I think they've got a softer pitch to women, whereas I'm saying women

Continued on page 18

NO SALE

eisa/OzEmail deal off

eisa's dream to acquire Australian ISP giant OzEmail is over.

OzEmail's parent company UUNet has pulled the plug on the merger, after eisa failed to come up with the required \$300 million to \$350 million.

"Under the agreement, eisa was required to have financing commitments in place [in May]. It is clear that eisa is not in a position to meet that requirement," UUNet officials said.

After announcing in February that it was to buy the consumer business of one of Australia's largest and best-established ISPs, questions were immediately raised as to how Melbourne-based eisa would pay for its purchase.

The first cracks appeared just a month later when eisa announced a net loss of \$13.8 million, almost three times the amount forecast in its prospectus.

But eisa managed to secure \$180 million of the funds required for the takeover through a series of deals with Fairfax online subsidiary f2, the ANZ bank and

Hastings Fund Management.

However, the financing was completely destabilised by the April tech stock crash. Worth \$2.98 at their peak, eisa shares plunged 56% on April 17 and have continued to slide in the wake of the market collapse. They were last valued at 24.5 cents before eisa called a trading halt.

In early June, all three backers announced they were withdrawing from the deal.

Fairfax was first up, saying it was pulling its \$40 million investment as it was unable to restructure a deal to its satisfaction that took into account the changed market conditions.

Three days later, ANZ and Hastings also departed. ANZ was to invest \$40 million and Hastings \$100 million. ANZ stated it was no longer in the interests of the bank's shareholders to proceed with the eisa investment.

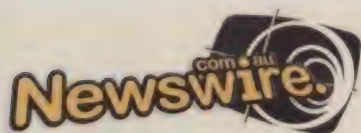
Adding to the company's woes, two eisa directors resigned on the eve of the financial yanking, citing med-



ical reasons. Chairperson John Pascoe was admitted to Sydney Adventist Hospital with meningitis, while director Michael Ball was admitted to St Vincent's Hospital with heart complications. Acting chairperson Evan Rees said "the news had come at a particularly difficult time, given the focus on the company".

Once again, OzEmail is on the market for the right buyer. It remains to be seen if Telstra will try for second time lucky, and if so, whether the Australian Competition and Consumer Commission (ACCC) will approve the transaction. News Ltd, Fairfax and AOL have been touted as possible contenders.

**Cosima Marriner and
Roulla Viacoumi**



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OUTCOME: Sick employees may be away for a few days. They can take current projects home on their mobile computers, access network resources via the internet and communicate by e-mail, so they're connected but not contagious. In the meantime, your other employees aren't getting sick and aren't taking sick leave themselves. The virus is quarantined and its impact minimised. Productivity stays high. Boxes of tissues last longer.

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TOSHIBA

Online adult industry steams up

Continued from page 19

are out there being sexually aggressive," she said. "My Web site is going to smack of sex."

Sharon Austen has signed an agreement with German company Beate Uhse to distribute its erotic products in Australia. SharonAusten.com went live in May, and at time of writing, the local site was expected to be launched at the end of June. Recently floated on the Australian Stock Exchange under the code SEX, Sharon Austen also intends to open a flagship outlet in Sydney.

AdultShop.com managing director Malcolm Day maintains he is not concerned by the emergence of a rival. "[Sharon Austen] has no retail experience, no ecommerce experience, no infrastructure and no wonder," he said.

Since launching its Web site in conjunction with a massive marketing push in January, AdultShop has obtained a virtual monopoly on the local online adult sector. Listed both here and in Germany on the Frankfurt and Berlin stock exchanges, the company operates the AdultShop.com and

Club X sites. AdultShop also has a substantial physical presence on the west coast of Australia, where it runs the Barbarella's retail chain of adult shops.

Day believes Sharon Austen is attempting to piggyback on AdultShop's success. "We're the leading Internet name in Australia," he said. "I definitely think Sharon Austen set her company up in the hope we'd take it over."

Despite this, AdultShop is taking no chances. The Web retailer has spent considerable time and money taking steps to consolidate its leadership position, including the pur-

chase of Australia's largest adult video mail order company AXIS. AdultShop paid about \$4 million for the company, which has over 200,000 customers and boasts the largest library of adult videos and DVDs in Australia and New Zealand.

"The future is the delivery of adult entertainment over the Internet," said Day. "Now we've got a captive audience of 200,000 people who like watching adult videos."

AdultShop has also spent about \$500,000 acquiring the sexshop.com domain name from an LA company. It intends to relaunch the SexShop.com Web site later this year, selling adult products and providing adult entertainment specifically targeted at men in Australia, Europe and the US.

"It is important for us to leapfrog over Sharon Austen," said Day, explaining the company's rapid expansion.

Confident that there are "no other companies left" in Australia worth buying, AdultShop has now set its sights on becoming the "Amazon.com of erotica".

The company has entered into an agreement to acquire San Francisco-based online adult retailer GameLink for approximately \$US6 million. In addition to assuming responsibility for running the GameLink service, AdultShop will use GameLink's infrastructure as a springboard for its entry into the US market.

"This is the best way for us to break into the US," said Day. AdultShop will expand GameLink's existing fulfillment facilities and a US version of the AdultShop.com site will be launched in the third quarter of this year.

Cosima Marriner



BOTH SIDES WRAP UP

Microsoft future in doubt

Microsoft is on standby for the long-awaited verdict on its future.

At the time of going to press, both the software giant and the US Department of Justice (DOJ) had submitted revised proposals relating to Microsoft's future.

At the remedies hearing on May 24, Judge Thomas Penfield Jackson dashed Microsoft's hope of extended hearings and said the case had dragged on for two years. "I'm not contemplating any further process," he said. Microsoft then revealed it had planned on calling senior executives Bill Gates and Steve Ballmer to the stand.

Judge Jackson praised two computer associations which submitted an "excellent brief"

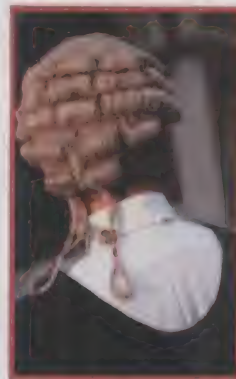
recommending the company be split into three entities: operating systems, applications, and browser companies.

The DOJ was then given two days to submit a 'revised' proposal. In its new submission, the DOJ and 19 states stuck to their original suggestion of splitting the company into two divisions: an operating systems business, and an applications business.

Microsoft described the DOJ's revised proposal as "extreme and unjustified", adding that it was "defective in numerous aspects, making the document vague and ambiguous".

Whatever Judge Jackson's ruling might be, Microsoft has already stated it is prepared to appeal against the decision.

Roulla Yiacoumi



ASIC WINS IN COURT

Web site owner jailed

The publisher of an online investment forum, The Chimes, has been jailed after defying a court order to take down his site.

The site's publisher, Stephen Lewis Matthews, has been sentenced to a three-month jail term for contempt of court. The Supreme Court of NSW heard Matthews ignored a court order obtained by the Australian Securities and Investments Commission (ASIC) to stop him publishing investor tips and securities reports without a licence.

In handing down the sentence, Justice Windeyer said that it was necessary to impose a prison term, instead of a fine, to ensure the integrity of

the justice system. Matthews avoided jail last June when he was given a two-month suspended sentence for contempt of court after he continued to run the chat room. He argued that people are entitled to express an opinion on financial matters.

Matthews then shifted The Chimes to a New Zealand server to put it out of reach of Australian Corporations Law, which requires anyone who provides investment advice to have a licence. ASIC pursued further contempt proceedings against Matthews, arguing that although the site is not published in Australia, it is aimed at Australians.

Fiona Angus

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MORE TO COME

Love bug bites

First we had the Melissa macro virus, then the ILOVEYOU worm, but experts are warning the worst is still to come.

In early May, computer systems around the world were crippled by a new virus, VBS.LoveLetter.A, also referred to as the 'ILOVEYOU' or 'love bug' worm.



Spread via email, people received a message with the subject line ILOVEYOU. The email contained an attachment LOVE-LETTER-FOR-YOU.TXT.vbs. When launched, it fires up Microsoft Outlook and copies itself to everyone in the address book.

The love bug can also spread via the mIRC chat program by modifying the script.ini file and either corrupting or destroying files with the following extensions: MP3, MP2M, JPEG, JPG, VBS,

VBE, CSS, JS, JSC, WSH, SCT and HTA.

Only systems running Microsoft operating systems are affected by the mass mail-out, but even those not using Outlook will find their MPEGs and JPEGs infected if the attachment is opened.

To complicate matters, the virus later began appearing under different names such as 'FW: Joke' and 'Mother's Day Order Confirmation', but the same Visual Basic script attachment remained embedded in the email.

In Australia, companies were hit hard with many system administrators taking their email servers offline to stop the infection spreading. Channel 7, the CSIRO, and AFL club Western Bulldogs were struck by the love bug. Overseas, the Asian Wall Street Journal and the Dow Jones were hit, and in Europe, the British House of Commons was affected.

Reports from the US said the virus entered 100,000 systems in its first hour and caused an estimated \$US5 billion to \$US10 billion to fix worldwide.

A 27-year-old man in the Philippines was arrested over the destructive worm, but was later released. His girlfriend's brother later confessed before a press conference that he might have been responsible for the 'accidental' release of the worm.

Roulla Yiacoumi

LEGISLATION HITS PARLIAMENT

Datacasting rules changed

The Federal Government has eased restrictions on the services datacasters can offer, but the firm distinction between datacasting and broadcasting remains intact.

Digital television and datacasting legislation has been introduced into Parliament, without some of the measures it had originally contained.

Announced last December, the government's digital television policy included a strict ban on datacasters broadcasting almost all forms of existing television-style content, such as comedy, infotainment and drama.

However, under the new legislation datacasters are permitted to provide extracts of up to 10 minutes of these programs. Datacasters will also be able to present news, sport, financial information and weather in 10-minute headline bulletins, or as individual stories of any length, as long as they are selected from a menu on the screen.

The government is hoping these restrictions will appease existing free-to-air networks, which are anxious to ensure datacasting services do not become de facto television broadcasters. "The new arrangements will help provide certainty to the industry, and ensure that datacasting services are different from television broadcasting," government officials said.

However, the government has refrained from prohibiting aspirant datacasters such as News Ltd and Fairfax from offering Internet access services. This follows the circulation of reports last month that the draft legislation included a ban on datacasters acting as ISPs.

The new legislation is much more favourable to existing free-to-air television broadcasters, which will be allowed to incorporate datacasting-style elements into their programming.

Provided they can justify a direct link between digital enhancements and the program material, television stations will be able to provide features such as multiple camera angles, or the choice between two sports matches that are occurring simultaneously.

The government's proposed triplecast model for the introduction of digital television has also been formalised in the legislation. As of January 1 next year, the free-to-air networks will be required to simultaneously broadcast in high-definition, standard digital and analog modes.

Within two years of commencing standard digital television transmissions, broadcasters will be required to provide at least 20 hours of high-definition programming a week.

Cosima Marriner

News Roundup

● Students will soon be able to qualify for a Microsoft Certified Systems Engineer (MCSE) certification while still at school. Microsoft Australia has entered into a deal with the Federal Government to train students in the use of Microsoft products. Students will be able to sit individual Microsoft Certified Professional (MCP) exams, which will go towards an MCSE

qualification. Microsoft has committed \$6.5 million over the next three years to the program. The company will also award two students \$2,500 each, if they can demonstrate that they have used Microsoft products in "innovative and creative ways to complete their studies".

● The NSW Police Service is warning all credit card holders to check their bank statements following widespread credit card abuse on the Internet. Computer

Crime Unit detective sergeant Phil Kaufmann said all credit card holders are at risk, regardless of whether they have ever used their cards on the Internet or not. Kaufmann said criminals are using fraudulent card numbers, randomly generated by software, to go on Internet shopping sprees.

● CrimeNet, a Web site naming convicted criminals, has been blamed for the abortion of a criminal murder trial. Justice

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DRUG STUDDER PAST

Tyler quits Solution 6

An ailing share price, revelations of a prior drug conviction, and the failure of two mergers all combined to seal the fate of Solution 6 CEO Chris Tyler.

After three years in the top job, Tyler resigned in mid-May, capping a disastrous stretch for the embattled accounting software and ASP company.

Turning up for an extraordinary shareholders meeting in May, Tyler was forced to admit that he had been convicted in South Dakota in possessing (in his own words) "a couple of garbage bags" of marijuana in 1985, and that he had been involved in failed Canadian software company Lessonware.

After vowing not to quit the company, Tyler changed his mind when newspaper reports promised more salacious details would emerge.

"Chris Tyler and the board of the company have mutually agreed that in the light of the recent events it is now in the best interests of shareholders for Mr Tyler to retire as CEO/MD of Solution 6, to be effective immediately," chairperson Brendan Redden said.

By the time fresh revelations were published concerning Tyler's arrest in 1981 for attempting to sell cocaine, Tyler was long gone.

The former CEO has returned to his native US with \$350,000 in his pocket as a six-month payout. "I regret that I am leaving early," he said in a statement.

But shareholders were probably regretting he didn't leave earlier. News of Tyler's resignation was welcomed by the market, which boosted the Solution 6 share price by almost 30% to \$3.78 within an hour of the announcement.



Now that it has rid itself of Tyler, Solution 6 is attempting to distance itself from its former chief executive. When confronted by the cocaine allegations, Solution 6 played down its connection with Tyler.

"Given that Chris is no longer an employee of the company, it's not relevant to Solution 6," the accounting software firm's marketing director Rushenka Perera said when contacted for comment. Tyler is expected to stay on as an 'informal' advisor to Solution 6 until November, when he must exercise his 10.9 million options.

Former Telstra executive and current Solution 6 chief operating officer, Lindsay Yelland, has been appointed acting CEO/MD of the company.
Cosima Marriner and Roulla Yiaccoumi

FREE ISP IN TROUBLE

ACCC slams GoConnect

Free ISP GoConnect has been given a grilling by the Australian Competition and Consumer Commission (ACCC) after less than 5% of potential subscribers were found to have been connected.

Following months of heavy promotion of its service, more than 300,000 consumers have signed up for GoConnect, but less than 15,000 have been connected. The service, which was officially launched on March 29, is available in Sydney, Melbourne and Brisbane.

The ACCC has ordered the ISP to stop the "unqualified promotion" of its service. ACCC chairperson Allan Fels said consumers would have been entitled to believe they would be connected once registering their details with GoConnect, but this is not the case. "GoConnect should have been upfront about its capacity to connect members and the delays that would reasonably be expected," he said.

Fels said that free ISPs are welcome to trade in the Australian market, but they are not exempt from the Trade Practices Act. "This outcome sends a strong message to businesses that make statements about future matters," he said. "They must ensure that they have a reasonable basis for making those statements, [otherwise] their statements can be deemed to be misleading under the Trade Practices Act."



However, GoConnect has refused to accept full responsibility for the delays, blaming Australia's two largest telcos for the problem. In its statement to the ASX, GoConnect said it has been "frustrated in its ability to offer connections to its members due to the lack of provisions of public switched telephone network (PSTN) interconnect links to infrastructure provider PowerTel". Telstra and Optus are the country's only two PSTN providers.

The company said it had finally received confirmation of the availability of additional PSTN links and expects approximately 60,000 consumers to have been connected by the end of June.

As well as its tussle with the ACCC, GoConnect is currently having a legal battle with wholesale ISP Connect, which claims its trademark has been breached by GoConnect's use of the word 'connect' as part of its moniker.

"There are some 15 other ISPs using the word 'connect' in their name," GoConnect officials said. "Our legal advice is that the claim by Connect.com is unlikely to succeed."

Roulla Yiaccoumi

News Roundup

George Hampel made legal history when he aborted the retrial in the Victorian Supreme Court because he believed there was a risk that jurors might glean information about the accused man's previous trial from the site. CrimeNet owner Ken Schultz claimed he was the subject of a "witch-hunt" on the part of Australia's legal establishment. CrimeNet,

which is not associated with the police, relies on information already on the public record for its content.

⊕ Fuel giant Caltex has launched Travelmate.com.au, an independent travel Web site for road travellers. The site allows travellers to plan road trips using detailed maps with time and distance measurements, and to book accommodation along the way. Local Caltex fuel outlets are mapped on the plan

and petrol prices — which are updated twice daily — are available. The site also includes travel and holiday information and accommodation discounts. It is anticipated that the Travelmate site will eventually be accessible on the road using wireless technologies.

For complete versions of these and many other stories, be sure to check into <http://newswire.com.au>.



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The effects of the April stock market collapse are still reverberating across the technology sector.

Tech stock crash: The aftermath

Deals have fallen through, floats have been repriced, business transactions are being re-evaluated and many public floats have floundered.

Dot coms have yet to fully recover from the Black Monday market plunge on April 17, which saw the All Ordinaries slump 176 points and technology stock valuations plummet by up to 50%.

Sausage and Solution 6 have been two of the highest profile casualties of the crash. The software companies were riding high in March after they announced a \$3.6 billion merger. Under the terms of the deal, six Solution 6 shares were to be exchanged for every 10 Sausage shares, leaving Sausage with a 47% stake in the combined company to be known as Solution 6. At the time, Solution 6 stock was worth \$9.55 and Sausage was selling for \$5.80 a share.

What a difference a month made. One of the hardest hit by the tech stock rout, Solution 6 shares were languishing at about \$3.88 in early May — a far cry from the \$100 CEO Chris Tyler promised shareholders they would see within a year — at which point Sausage decided the original terms of the deal significantly undervalued its business.

After a tense week-long stand-off, the deadlock was finally broken when Sausage announced it had increased the terms of its takeover offer for IT services company SMS Consulting Group. Forced to alter its bid in the wake of the tech stock decline, Sausage revised its offer from nine Sausage shares for every 20 SMS shares to 1.58 of its shares for every SMS share. The new proposal found favour with SMS shareholders and Sausage acquired SMS in late May.

Sausage's SMS purchase sounded the death knell for the Solution 6/Sausage merger. A day after the news surfaced that Sausage had upped its offer for SMS, Solution 6 announced that "in no circumstances" would it increase its bid for Sausage. "The directors have determined that to do so would be clearly unfair to Solution 6 shareholders, given the substantial increase in the Sausage bid for SMS Consulting Group," officials said.

The ramifications of Black Monday for Solution 6 did not end there. Not only has it had to contend with a plummeting share price and a failed merger, it is now facing

the prospect of Telstra re-evaluating its \$237 million asset deal. Although Telstra officials said the market volatility did not affect "the strategic integrity" of the proposed transaction, the telco has conceded the terms of the deal are under review.

One high-profile international union foiled by the April stock rout was the Corel/Inprise merger. The US software companies were to collaborate on Linux development in a \$US2.4 billion merger to break Microsoft's stranglehold. However, less than three months after it was struck, the deal was "terminated by mutual agreement".

Corel attributed the split to "significant changes since the merger was agreed to". Although a three-year confidentiality agreement prevents either company from discussing the failed transaction, Corel's ailing Nasdaq share price — it has fallen 75% since February — no doubt played a part.

Local technology IPOs have also borne the brunt of the fallout from the crash. In a market struggling to recover from the investor sell-off of tech stocks, the vast majority of dot com IPOs since then have bombed, listing at a minimum discount of 20% on their offer price.

worldschool and ehyou.com have been among the worst performing market debutantes, as their share prices declined by between 40% and 65% when they went public.

Formerly Richfield Resources, ehyou.com, the operator of MP3.com.au, attributed its abysmal debut to "the exit of shareholders in the former mining company who have been unable to trade their shares for more than one year".

In this topsy-turvy world of wildly fluctuating technology stock valuations, one thing is for certain: if it involves sex and the Internet, it's sure to be a winner. Online adult products retailer Sharon Austen made a solid debut on the ASX, closing 4% higher than its 50 cent issue price, at 52 cents (see story, page 19).

Property information provider RP Data also managed to defy the trend that most technology IPOs have fallen victim to: it ended its first day of trading at 51 cents, a 2% premium on its 50 cent offer price.



The share market plunge has also forced many companies to adjust their capital raising plans. Communications company Optecore has repriced its \$24 million share offer, discounting it by 37.5%. Instead of the original 40 cent price tag, Optecore stock is now selling for 25 cents.

More drastic was the decision by Vodafone and ComVergent (formerly RSL Com) not to proceed with their respective floats. The day after ComVergent announced the postponement of its \$360 million IPO, Vodafone announced it too was holding off on its \$2 billion IPO. Both telcos blamed the poor market conditions for their decision.

Mining company-turned-dot-com investor Grange Resources cancelled the second stage of its \$12 million capital raising "as a result of the market downturn."

Likewise, technology investor FTR Holdings reduced the amount of capital it was seeking from a rights issue. Citing "changed market circumstances", the company amended the terms from a one-for-four issue at 60 cents a share to raise \$16 million, to a one-for-three issue at 33 cents to raise \$11.7 million.

Mining company First Australian Resources has backed away from the volatile technology sector altogether, dumping plans to invest \$US3 million in Humanot.com, a US company developing search engine technology. "Today technology is a dirty word," chairperson Michael Evans said. "If you mention it to people they're likely to sell your shares, whereas a month ago it was the only way a small company could raise new equity and garner investor attention."

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A nonprofit Australian Web site has become the target of US publisher IDG Books.

The Dummies trademark spit

Ruthless online policing of its well-known For Dummies trademark has earned technology publisher IDG Books (IDGB) notoriety on the Web.

Sites containing the two words in sequence have received letters threatening legal action if the offending pages are not removed. In May, the controversy reached Australia when a nonprofit arts group in Newcastle, NSW, satirised the book series.

After reading letters from IDGB's lawyers about a page on his site which included the words 'for dummies' in its title, Octapod volunteer Nick Ritar was so annoyed that he posted a fake book cover entitled *Corporate Standover Tactics for Dummies*. It contained cover lines such as "Once I started reading, I couldn't put it down . . . Instantly I felt like a cold, hard bastard" and "The fun and easy way to learn how to patent the English language".

Octapod (<http://www.octapod.org.au/>) is a volunteer centre which provides self-publishing and communication tools for artists, particularly students and the unemployed. The group coordinates annual arts events such as electrofringe, the National Young Writers Festival and Cultural Stomp.

"We were teaching people how to screenprint, and as part of that series of workshops, Octapod volunteer Sean Healy created a Web page called *The Idiotic Guide to Screenprinting for Dummies*. It was just a basic little page that he spent half an hour putting up," Ritar said.

Two years later, on October 28, 1999, Octapod received an email from the 'trademark coordinator' at IDGB, demanding the material be removed from the Web within two weeks.

"It was quite direct," Ritar said. "It gave us no option, take it down or else. We weren't particularly impressed. At the time we had a lot of other things going on . . . we were too busy to deal with it."

Healy informed IDGB that Octapod would discuss its request at its next meeting in December of that year, and then again in January, but the volunteers were busy and by February 2 the page was still online. A strongly worded letter from IDGB's senior attorney was addressed to Healy: "Please be aware that IDGB is now fully prepared to enforce its rights to protect its registered

trademark and has every intention of promptly sending this matter to outside counsel in your country."

Octapod changed the title to *The Idiotic Guide to Screenprinting 4 DummieZ* and Healy sent a weary reply to IDGB. No more was heard from the publishing company.

However, when Ritar placed his parody online and a link was published on hardcore tech news site Slashdot, Octapod received 40,000 page impressions on one day, on a page which linked to the original offending document. Until then, only about 50 people had ever accessed the screenprinting guide in its three-year existence.

Ritar estimates he has now received 200 to 300 emails from visitors, mostly letters of support. But several were in support of IDGB and he now admits some sympathy for the company's position.



The parody cover created by Octapod

"We don't actually hate IDGB. We just think the whole thing is stupid, that corporations are forced to use their muscle to intimidate small nonprofits into capitulation," Ritar said.

In the US, trademark law requires that a company is seen to protect itself from 'trademark dilution', because there is a risk that if the name enters popular expression it will lose its legal protection. People have come to use 'for dummies' as an everyday expression and if IDGB wishes to keep the trademark valid, it must try to police this.

In its legal letters, the company cites examples of trademark dilution such as

Kleenex tissues, Scotch tape, Xeroxing and Aspirin. Each of these words has entered everyday language.

However, the US law which requires IDGB to take action also states that non-commercial use of a trademark, or the use of a trademark in news reporting and commentary, is 'not actionable'. In policing 'for dummies', it appears the company may have simply used search engines to find where the two words appear on the Web, and emailed site owners accordingly.

In October last year, the administrator of a mailing list archive received a take-down letter from IDG Books regarding an archived email sent in 1998 suggesting that a 'for dummies' book should be written about sendmail. The Swedish author of a nonprofit guide to a role-playing game was also asked to remove the words from his page. Lars Feltby was so incensed that he set up a protest site detailing his case. A Norwegian who published a Web page called 1914 For Dummies was also pursued. To this day, these pages and others remain online, despite their authors being billed by IDGB for legal costs.

John Goerzen, author of the *Linux Programming Bible* published by IDGB, has publicly stated he is re-evaluating plans to write further books for the company following its 'for dummies' actions, saying he cannot understand its concerns about nonprofit sites using the phrase.

"If they were printed and sold in bookstores with a yellow cover, I'd easily support your claim," he wrote in an open letter.

Goerzen has deliberately published a Web page containing the words 'for dummies'. Meanwhile, supporters of Feltby have threatened to reproduce his page on their own servers.

However, Ritar contends that other nonprofit Web sites targeted in this manner do not have to take action.

"Tell 'em to go stick it, basically. It's not illegal, you're not breaking the law. Especially when it is a parody. And the thing is, the words 'for dummies' are going to be used for parody all over the place, it almost becomes a parody just by using those words.

"It's pretty hard trying to defend the trademark — it's like trying to copyright a joke."

Simon Vandore



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- Integrated 1.44MB Floppy Disk Drive
- Integrated 10xMin/24xMax CD ROM
- 16-bit Stereo sound, internal speakers
- Integrated 56k Data/Fax Modem
- 2 Type II or 1 Type III PCMCIA slot
- Li-Ion battery & 70W AC Adapter
- MS Windows 98 SE
- MS Works Suite 2000
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ADSL, ain't it swell?

After years of hearing promises about a broadband technology called ADSL, a service has finally been launched in Australia. **Josh Mehlman** investigates whether it provides the Net access speeds we've all been waiting for.

Telstra is not officially launching ADSL (asymmetric digital subscriber line) until August, but already some telecommunications companies and ISPs, such as Primus Telecom and Pacific Internet Corporate (PIC), are offering ADSL both to wholesale (that's other ISPs) and business customers. Initially, ADSL will not be an option for most home users, but it should filter down through the business market to consumers eventually.

ADSL is a technology that enables high-bandwidth, constant data connections through a regular phone line. The phone line can be used simultaneously for a normal voice connection without interfering with the data transmission.

The 'asymmetric' part means that ADSL has a much higher download band-

width than upload, and how fast it is. Pacific Internet Corporate provides ADSL in two speed grades: one allows downloads of 1.5Mbps and uploads of 256 kilobits per second (Kbps), and the other has a download speed of 256Kbps and an upload speed of 64Kbps. It seems likely that other competitors, including Telstra, will follow similar models.

Installation

One of the big limitations of ADSL is that it must have a copper wire connection from the phone jack in the wall all the way to the telephone exchange. If any part of the connection goes through a digital link, for example a switchboard, it won't work. In order to make sure you can connect, Telstra technicians need to check your phone line to confirm that it will be capable of carrying ADSL.

Pacific Internet Corporate promised us that this can be done within 24 hours. APC's connection was originally due to be installed at 8am. At about 11am, the first technician showed up, but it turned out he didn't know anything about ADSL, so he went back to the office. At 4.30pm a second technician arrived, who knew about ADSL, and installed the modem. APC's reviewers had similar difficulties trying to get cable connections installed, and feedback from our readers suggests this is a fairly common experience.

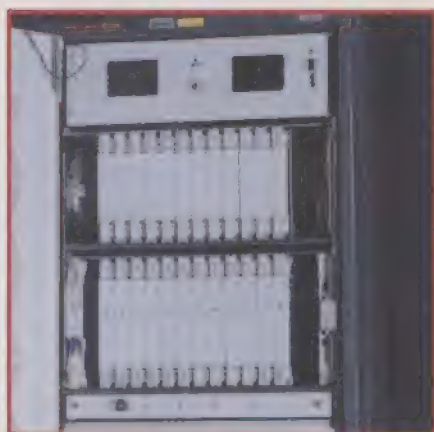
Telstra technicians suggested we use the office fax line, since faxes are most frequently connected directly to the phone network. A regular modem would tie up the fax line, making it impossible to send and receive faxes while connected to the Internet, but an ADSL modem does not interfere with the regular operations of the phone line. The fax machine worked as normal, but occasionally the data connection dropped out while the fax machine was dialling. However, it soon restored itself.

The modem used for testing was an Alcatel Speed Touch, which is about twice

the size of a regular external modem. It has both Ethernet and ATM interfaces, and can pretend to be an ATM connection in order to plug into a router. Physically installing the ADSL connection was so simple, the technician who eventually came to do it shouldn't have wasted his time. The installation involved finding the correct phone line, installing a splitter, and plugging in the modem. Five minutes and it was done. It's just about as easy as installing a regular modem, which is something the vast majority of APC readers would have no trouble doing on their own.

Hanging the ADSL modem off the back of a router to share the connection over an entire office would be slightly more complicated. Although we didn't do this in the test, it would require a separate visit from a technician from the ISP providing the access.

Once the modem was physically installed, a PPPoE (PPP over Ethernet) client was installed on a PC, and the PC was plugged into the ADSL modem. PPPoE is a technique for establishing a standard PPP (Point-to-Point Protocol) Internet connection through an Ethernet network. PPP is the most common protocol used for dialup modem connections. The PPPoE client worked the same way as the standard Windows dialup networking client, but with one big difference. Connecting through



Alcatel's ASAM DSLAM: dirty data done dirt cheap

width than upload, since most Internet users download a great deal more data than they send out. ADSL is already in fairly widespread use in the US, several countries in Europe and even New Zealand. ADSL can theoretically transmit up to nine megabits per second (Mbps), but the connections available in Australia don't push the technology to its limit.

APC installed an ADSL connection through Pacific Internet Corporate (<http://www.pacific.net.au/adsl/>) to see

Ping site	Ping time (ms)
Telstra	158
Optus	75
ABC	77
apcmag.com	150
OzEmail	76
Sprint	414
AT&T	402

File size (M)	Download time (minutes:seconds)	Download speed (Kbps)
2.0	0:30	70
18.6	3:06	100
42.6	10:40	67.9

ADSL is almost instantaneous. As long as your details are correct, when you click on the connect button, you're connected.

Testing

To begin testing, APC performed the same tests as those used in APC's biannual ISP reviews. When APC tested Telstra and Optus cable Internet connections in April (see APC April, page 30), the ping times were much faster than a dialup Internet connection. Gamers take note: ADSL was not as fast. It averaged about 75 milliseconds (ms) for Australian sites, and about 400ms for US sites. This is faster than a modem connection, but it is not quite as zippy as Telstra cable, which had ping times of about 12ms to Australian sites and just over 300ms for US sites.

After the standard tests were over, we started to have some fun. Web pages loaded noticeably quicker than when using a modem connection, and connecting to APC's mail server was almost as fast as doing so through the internal network. We played four 300Kbps streaming videos simultaneously. The connection seemed to peak at about 160 kilobytes per second (Kbps) or 1.3Mbps (which is fairly close to the theoretical 1.5Mbps limit of the modem). It averaged around 140Kbps.

Big file downloads were a breeze. A 2M file came through in 30 seconds, averaging 70Kbps. An 18.6M file downloaded in just over 3 minutes (an average of 100Kbps) and the entire 42.6M of the BeOS 5 installation file transferred in less than 11 minutes (an average of 68Kbps). As with any type of Internet connection, a lot depends on the server, and choosing the wrong server can theoretically make a download just as slow as over a regular modem.

Availability

There are two factors limiting the availability of ADSL. The first is the well-known distance factor; ADSL works best if the user is within about 3.5km of the telephone exchange, which rules out many rural and regional customers. In addition, Telstra has to install a DSLAM (digital subscriber line access multiplexer) in each local exchange for users to connect to. A DSLAM is similar to a modem multiplexer in an ISP. At one end it's connected to the phone network, so that multiple ADSL users can connect to it. At the other end, it's wired into a data backbone, such as an ATM or frame relay network.

DSLAMs are not particularly cheap, so

Comparison of high-speed Internet prices with PIC

Connection	Installation cost	Monthly cost	Volume charge
64Kbps ISDN	None	\$290	12.9c per M
128Kbps ISDN	None	\$445	12.9c per M
256Kbps DDS Fastway	\$3,500	\$1,190	12.9c per M
2Mbps DDS Fastway	\$3,500	\$2,500	12.9c per M
256Kbps/64Kbps ADSL	None	\$110	12.9c per M
1.5Mbps/256Kbps ADSL	None	\$350	12.9c per M

Source: Pacific Internet Corporate

Telstra is first installing them in the exchanges with the highest proportion of business customers. These are mostly CBD and inner city areas, but some residential exchanges will also be fitted. When APC ran its tests, ADSL was only available in seven Melbourne telephone exchanges, three in Sydney and two in Brisbane. Since then, Telstra has announced plans to install ADSL equipment in 200 exchanges by the time of its official ADSL launch. Check with the provider to see if you're eligible. However, even if you're connected to the right exchange, Telstra techies still need to do a feasibility study to make sure you can get connected.



Alcatel's Speed Touch ADSL modem

Pricing

Charges vary depending on the provider. Some carriers have higher monthly costs and lower volume costs, others charge a minimum for the connection and higher rates for volume. Pacific Internet Corporate's pricing is of the second variety. The per-month cost only covers Telstra's connection charges, but PIC makes its money charging by data volume, according to PIC director of corporate and wholesale, Lorenzo Modesto. This means the same charges apply for data volume, regardless of which type of connection is installed.

Using this pricing structure, ADSL compares very favourably to other connection types. For only \$60 per month more than the cost of 64Kbps ISDN (\$290 a month), customers can install an ADSL connection

with 1.5Mbps download and 256Kbps upload bandwidth. A 2Mbps DDS Fastway connection costs \$3,500 just to install, then \$2,500 per month, plus the same volume charges. A 256Kbps DDS Fastway connection costs \$1,190 per month, compared with only \$110 per month for an ADSL connection that has 256Kbps download and 64Kbps upload capacity. PIC charges a flat rate of 12.9c per M of data volume — both uploads and downloads — for all these connections.

However, ADSL is not suitable for all applications, and there are advantages to other types of connections. ISDN connections can be used to carry multiple phone lines as well as data. ADSL is not suitable in most cases for providing WAN links between offices, since these generally require symmetrical bandwidth. Unlike managed services such as ATM or DDS Fastway, ADSL does not have guaranteed uptime, so it is not suitable for WAN links or Web serving. But in terms of providing fast but cheap Internet access for a small business, it's perfect.

According to Modesto, ISDN prices will drop once ADSL becomes commonplace. Otherwise, current ISDN customers, particularly those with dialup rather than permanent connections, will flock to ADSL because it provides greater bandwidth at a lower cost. This would be very expensive for ISPs and telcos, even if customers stayed with the same provider.

An ADSL modem costs about \$600 to buy outright, but PIC spreads the cost of the modem over the lifetime of the connection, meaning customers don't need to pay for the modem upfront. It's expected that most ADSL providers will adopt this model, which is used by most mobile phone providers.

Contact	Pacific Internet Corporate
Phone	1300 363 313
Online	http://www.pacific.net.au/adsl/
In short	Price-competitive with other business broadband.

Sony PlayStation2

The PlayStation2 won't be out for months, but already it's approaching 'legend' status. Sony's publicity machine has shifted into top gear in anticipation of a simultaneous launch in Europe, the US and Australia on October 26. Those who have been fortunate enough to see the PlayStation2 beforehand mostly describe it in tones of awe befitting a religious experience.

This is not one of those reviews.

PlayStation2 uses the same power supply, AV connector, controller ports and memory slots as the PlayStation, and the vast majority of PlayStation games will still work (but not all, which has generated some controversy). Sony isn't going to alienate its customer base by making all its old equipment obsolete — something other console manufacturers could learn from.

PlayStation2 has been designed to be much more than a game console. It has two USB ports, one i.Link (Sony's name for IEEE 1394) connector and an optical digital audio out socket. The software doesn't exist for it yet, but a look at these connectors makes it easy to guess the console's possible functions: USB for adding keyboards, mice and digital cameras and i.Link for plugging in a digital video camera, for example. PlayStation2 also has space for a 3.5in hard disk drive and an Expansion Unit, which appears to be a standard Type II PC Card slot for connecting to a network, cable modem or DSL modem.

Unofficially, the price is expected to be \$699 at launch. Even more unofficially, the price could come down to as low as \$599, according to sources at *The Official Playstation Magazine*. At this price, it's cheaper than most standalone DVD play-

ers, plus it plays games, and is likely to do a lot more in the near future. Sony is already talking about Internet access, multiplayer games and electronic distribution of content.

Despite using DVD format, which holds much more data than PlayStation CDs, PlayStation2 games take about the same time to load. Sony's graphics rendering hardware is among the best available today, and it shows.

The unit APC examined was a Japanese PlayStation2, encoded for region one DVDs, so we were unable to test playback. The DVD encoding software is saved to memory card on Japanese consoles, but it's been suggested that the local release may be encoded within the machine itself.

APC's reviewers looked at four of the titles that will be available when PlayStation2 launches: Ridge Racer V, Dead or Alive 2, Tekken Tag and Drum Mania. The first two blatantly exploit the PlayStation2's new abilities to maximum effect. Car racing game Ridge Racer 2 presents curved, reflective surfaces and complex 3D environments: the first race track goes through a complex and varied cityscape with rounded glass skyscrapers and other features that most rendering engines wouldn't cope with.



Martial arts fighting game Dead or Alive 2 exhibits an impressive level of realism in the modelling of human bodies: clothes, hair and certain body parts react dynamically to the movement of the body and to the wind. The fighting environments use effects like snow, fog, and water that splashes when characters jump into it.

This exhibitionism is not uncommon; demos we've seen of Gran Turismo 2000 include liberal applications of the heat-haze effect, with mirages appearing on road surfaces.

One thing that is noticeable about these games in terms of gameplay, is that they are almost identical to their PlayStation predecessors, such as Ridge Racer Type 4 and Dead or Alive. Almost all of the effort has gone into updating the technology. However, Sony is also designing new games such as 3D RPG Dark Cloud which are built from the ground up for PlayStation2.

Thanks to *The Official Playstation Magazine* for the opportunity to review the PlayStation2.

Josh Mehlman



Contact

Sony Computer

Entertainment

Phone

1902 262 662

Online

<http://www.sony.com.au/>

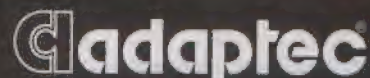
Price

Expected to be about \$700

In short

Easily the most impressive console to date.

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ULTRA160... **the new SCSI standard**

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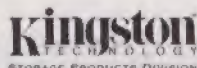
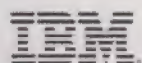
The need for speed has never been more apparent before. As transfer rates hit the 100Mbytes/sec mark, your system's I/O interface becomes a critical gateway for smooth and reliable data flow. Adaptec's latest innovation, Ultra160 allows for just that! Built on the Ultra2 LVD legacy, it is also backward compatible to Ultra2. You can even use the same cables, connectors and terminators! So don't let your system choke, keep pace with technology with Adaptec's Ultra160, the investment for the future.



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i n v e n t

Adobe Illustrator 9.0

When it comes to pixel-based applications used for photo editing, graphic designers generally agree that Adobe Photoshop is the industry standard. When it comes to vector-based applications used for drawing, designers start behaving like revheads. The battle of Adobe Illustrator versus Macromedia FreeHand versus CorelDRAW is not unlike that of Holden Commodore versus Ford Falcon versus . . . whatever.

Ask any designer which is the best, and they'll tell you what they use and why (but they might not mention that after investing hours in acquiring the skills to use their chosen application, they can't bear the thought that something else could be better).

Adobe Illustrator's main advantage is its easy-to-use pen tools, which other applications have imitated. Illustrator 9.0 has a number of minor improvements and some new Web features, which are more advanced than those of competing packages.

Creating a new document now requires users to choose one of two modes: CMYK for publishing or RGB for the Web. RGB mode allows its Websafe colour mode to be activated. Illustrator 9.0 also has a Pixel Preview mode, which allows you to quickly view documents as they would appear on the Web at 72 pixels per inch.

Files can now be saved in JPEG, GIFF or PNG format, where a preview window displays up to three different settings at a time. You can then tailor different compression levels before saving. Pages can also be saved as PDF files to minimise file size or for proofing documents. This is useful for emailing pages, logos or illustrations.

Graphics can be exported as Macromedia Flash files (SWF frames) and the frames per second can be set; this allows images to be animated and/or edited for use on the Web. Layers of artwork can be assigned as a frame in an animation sequence, much like pages of a flipbook. You can also create buttons for Web pages, by assigning JavaScripts to graphics such as rollovers. This is a feature of the SVG (Scalable Vec-

tor Graphics) palette; you simply select the object and choose the desired setting from the pull-down menu. SVG, which is underpinned by XML, also allows objects to include gradients, embedded fonts, transparency, animation and filter effects using plain HTML code. All objects are retained in vector format, which means they can be rescaled (to smaller file sizes and faster download times than raster graphics) without loss of resolution.



There are two new lasso selection tools — one for whole objects, the other for parts of objects — which make selecting overlapping items easier. In previous versions of Illustrator, this works by dragging a box around the item and then deselecting unwanted objects that fall in its path. In Illustrator 9.0, as with Photoshop's lasso selection tool, you just click and drag a line around the shape to be edited.

Illustrator 9.0 also has improved rotation of items, which is similar to Photoshop's rotation option. When you move the pointer to the corner of the object to be rotated, a curved line with arrows at each end appears, which you can click and drag. This is quicker to use than previous versions of Illustrator, where you need to access the rotation tool in the tool palette. The rotation tool is still there, but you only really need it for absolute degrees of rotation.

Other new features are mainly focused on improved compatibility between Illustrator and Photoshop, to reduce the need for switching back and

forth between applications. These features include improved transparency controls, which can now be applied to an unlimited number of objects with different blending options. As layers can now be exported, they can be incorporated with Photoshop layers.

Illustrator 9.0 has an option to make pages transparent (Photoshop has a similar feature). This allows you to determine whether a logo will have a non-

white background when it is on top of a coloured picture box. Clipping paths can also be brought into Photoshop from Illustrator files, so when they are opened a white background is no longer evident behind files, allowing the layers underneath to be seen.

Additional Photoshop 5 features introduced in Illustrator 9.0 include effects options such as drop shadows, outer glows and feathering. The inclusion of these options is long overdue.

With Illustrator 9.0, text can be brought into Photoshop 5.0 and re-edited as a text layer. A styles palette

has also been introduced, which allows you to use standard backgrounds, borders or buttons (which are quite tacky), or create your own original designs and store them for future use.

The keyboard shortcuts can be tailored to suit, which saves people familiar with other applications from having to learn new shortcuts. Third-party plug-ins are available to add extra effects to Illustrator's features.

Illustrator 9.0 has good compatibility and a great range of features, making it a worthwhile upgrade for existing Illustrator users. It's worth considering, even if you haven't used Illustrator before.

Craig Carroll

Contact
Phone
Online
Price

Adobe
(02) 9778 4100
<http://www.adobe.com/>
\$789 (available June 24),
upgrade \$280
New Web features and
integrated Photoshop 5
tools make this a
worthwhile upgrade option.

In short



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what's coming, but with intel's gigabit network solutions, you can always be prepared. intel 6000 series chassis switches, stackable 500 series switches, and workgroup switches optimise port performance and reduce traffic congestion. intel's gigabit server adapters provide scalable bandwidth and fault

tolerance for mission-critical servers, in addition, the intel netstructure e-commerce accelerator, the intel netstructure e-commerce director and the intel netstructure cache appliance with secure socket layer technology ensure that e-commerce website applications deliver faster throughput, as well as more secure and reliable transactions through lower cpu utilisation. so get ready for the inevitable, get intel netstructure network solutions and get down to serious e-business. for more details, and to locate an intel authorised solution provider, visit us on the web. → intel.com/au/network



Epson EMP-710

Epson's latest foray into the ultra light and portable LCD projector market, the Epson EMP-710, takes very little time to power up and begin projecting an image. Swapping through image inputs is performed by a toggle switch on the top of the unit (most projectors require searching through the OSD). Controlling the image quality works in a similar way, with keystone and colour controls on top of the unit. The focus and zoom rings are controlled manually, and the projector lens recesses

back into the main unit housing to protect it when travelling.

The EMP-710 didn't seem to heat up as much as other units APC has looked at, and it runs reasonably quietly. The unit's cooling fans don't kick in to cool it down until you've finished projecting.

The EMP-710 can throw an image up to 13.8m away, with image sizes ranging from 65.3cm to 7.63m (two to 25 feet) — more than enough for the office, boardroom or meeting hall. It has an ANSI lumen rating of 1,000, but it seemed slightly brighter than that. Epson says the projector has 85% image uniformity, and we couldn't discern any significant fading or defects.

The now common mouse/pointer controller has also been included with the EMP-710. This handheld remote allows you to control the PC, presentation or projector from a maximum distance of 10m. Alternatively, the unit also has a USB and serial port for connecting a mouse.

The projector has a 15-pin VGA connector, composite video input and S-Video

input, and supports the major video formats (PAL, NTSC, SECAM) plus VGA, UXGA, SVGA and XGA to a maximum resolution of 1,024 by 768 projection. It comes with a mono speaker (not much better than an internal PC speaker), but also has multiple audio inputs and outputs (one stereo input and output jack, plus two RCA inputs) so that you can plug in external speakers.

The only drawback with the unit is its price. At \$12,750, it's out of reach for many smaller businesses. However, for large corporations with big budgets, the EMP-710 should be just the ticket.

Darren Ellis



Contact Epson
Phone (02) 9903 9000
Online <http://www.epson.com.au>

Price \$12,750
In short An excellent projector, with crisp bright image quality. It's portable and easy to use.

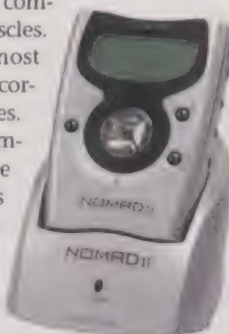
Creative Nomad II

With MP3s carving up the bandwidth on a desktop near you, you would think that portable MP3 players would be everywhere. They're not. The problem is that manufacturers are looking hard over their shoulders at big music companies, and big music companies tend to have large legal muscles. As a consequence, Creative's most recent portable MP3 device has incorporated a couple of unique features.

First, it has no permanent memory (possibly so Creative can't be accused of storing songs on its devices). Second, it has a firmware upgradable player section, so if some kind of restriction or watermarking does become the norm, it will theoretically still be able to play music. Neat on both counts.

The design is also very neat, with a nicely rounded profile and simple controls accessed either by a four-way toggle dial or direct action buttons for volume, record, menu and so on. Connectivity to a host PC is via a USB port, which hides under a rub-

ber flap. Another rubber flap hides the charging/connecting socket for the optional desktop cradle (which will probably last a full five minutes after purchase). Apart from this flaw, the new model is definitely better built than its predecessor and has a much more solid feel.



The headphones are a very groovy pair of neckrest-style muffs — not tinny earbuds as supplied with most players. These connect via an integrated remote control for accessing the main play buttons.

Basic graphic equalisation is covered with a DSP control, and the whole lot boogies along on one AA rechargeable battery and a 64M SmartMedia memory card under a flap on the back. Bundled software includes a re-skinned version of MusicMatch 4.3, and the Nomad Manager file exchange utility.

Installation and recognition of the USB was a cinch, and we had files swapping between the Nomad and the desktop in

double quick time. A 3M music track was downloaded in about 15 seconds — not as fast as expected, but certainly much faster than using a serial link.

Voice recordings (but not MP3s) made on the Nomad can be uploaded to the host and converted to WAVs. The Nomad can also be used as an FM radio, with surprisingly good quality reception, although tuning stations is a bit complex. The multi-line LCD is OK, but not quite as slick looking as the new Rio. In terms of output, the sound of all (160Kbps) tracks was top quality, with minimal sibilance and very clear mid-tones.

This player is good value and has some worthwhile updates on the original Nomad.

Jeremy Torr

Contact Creative Labs
Phone (02) 9666 6100
Online <http://www.australia.creative.com/>

Price \$699
In short A legally savvy and worthwhile update to the original Nomad.



The works without the works.

This Panasonic digital LCD monitor may be slim, but its 19" viewable screen is one of the biggest available.

Yet the LC90S's tiny footprint means you can have all the advantages of a big screen on a small desk.

The LC90S is only a fraction the depth of a 21" CRT monitor with almost the same viewable area. (Which begs the question, why buy a CRT when you can buy an LCD this slim?)



You also get the benefits of built-in bass reflex speakers, a 6 port USB hub, dual VGA inputs and compliance with the latest emissions and environmental standards.

The LC90S has superior image clarity and resolution plus a viewing angle of 160° (the best in the industry). And the LC90S is part of a range as wide as its screen. LCDs come in either 15", 19" and 23" with a 23" screen on the way.

We don't stop there. Panasonic makes award-winning CRTs in 17", 19" and 21" in a choice of entry level or professional, flat screen or short length.

Surprised? Don't be. Panasonic is one of the world's largest monitor manufacturers.



Panasonic

Customer Care Centre: 13 2600 • website: www.panasonic.com.au

APC Mag. Editor's Choice Highly Commended award: SL 95 • PC World Best Buy awards: PF 90, E 50i, LC 50S, S 50i • PC Magazine Editor's Choice award: PF 90 • PC Authority Value award: S 110i

Swift & Ulin PA XV (Aust. Personal Computer)

Toshiba Portégé 3440CT

Smaller notebooks are usually underpowered compared with the full-sized variety. They require a smaller battery and a less power-hungry processor to maintain battery life. Intel's mobile processors are not known for their power efficiency, which is why many notebook manufacturers have turned to AMD. However, the power consumption of the new mobile 0.18-micron Pentium III is relatively lean, which means that even tiny notebooks like this one don't have to be crippled by a slow processor. Toshiba also has a new cooling system that uses liquid rather than air to direct heat away from the processor.

The Portégé 3440CT is small, stylish and very portable. It has a 500MHz Mobile Pentium III processor, 64M of SDRAM and a 6G hard disk drive. It weighs only 1.6kg and although it's not quite palm size, it can be carried around easily in one hand. It has an S3 Savage IX graphics controller with 8M of memory, and a small but easy-to-read 11.3in TFT screen.

Toshiba pulls off the popular silver and charcoal colour combination with more style than its competitors, and a tough magnesium alloy case protects the LCD. The trackpoint controller is also good. In addition to the two standard mouse buttons, there are two small programmable buttons set as default to scroll up and down.

The 3440CT chassis is so small that it doesn't include a floppy disk drive or a CD-ROM drive. The floppy drive plugs into the USB connector on one side of the notebook, while the CD-ROM drive plugs into one of the two PC Card slots on the other side. Considering its size, it's well equipped with connectors, including an external monitor VGA socket, a USB socket, connectors for headphones and a microphone, and an internal modem. There's also a port replicator that connects to the notebook via a chunky cable, which adds serial and parallel ports, a PS/2 keyboard or mouse connector, and an Ethernet port.

Toshiba claims the 3440CT has a battery life of up to nine hours, but this only applies when a special high-capacity battery is added. The battery lasted exactly three hours in the Ziff-Davis BatteryMark test, which is longer than any of the ultraportables APC reviewed last month (see APC June, page 104). The battery tests were run in both full-performance and battery-optimised mode, but as the processor runs at 500MHz in both modes, the difference to battery life was negligible.

The Portégé 3440CT's keyboard is badly designed. The Enter and right-hand Shift keys are tiny, and the cursor control keys are in an unusual location.

Despite this, the 3440CT is impressive. Compared with the ultraportable notebooks APC reviewed last month, the 3440CT is an excellent performer at a reasonable price. It beat the top notebook from the June roundup, Compaq's Armada M300, in every test.

Josh Mehlman



Product

Contact

Phone

Online

Price

Warranty

Specifications

Processor

Secondary cache (K)

RAM and type (maximum RAM)

Hard disk drive and type

Hard disk controller

Hard disk file system

Video bus type

Video RAM

Video controller chip

Pointer device

Dimensions (h by w by d)

Bare minimum weight

PC Card slot type

CD-ROM drive/DVD

Soundcard

Internal modem (price listed if optional)

Display

Maximum internal resolution

Maximum external resolution

Battery type and rated battery life

OS available

Expansion slots

Benchmark results

CPUmark99

FPU WinMark

Business Disk WinMark 99

High-End Disk WinMark 99

Business Graphics WinMark 99

High-End Graphics WinMark 99

Business Winstone 99

SYSmark 2000

BatteryMark: Battery rundown time

Portégé 3440CT

Toshiba

1800 021 100

<http://www.toshiba.com.au/>

\$4,390

Three years

Intel Pentium III 500MHz

256K

64M SDRAM/192M

6G EIDE

Intel 82731AB/EB PCI BusMaster

FAT32

AGP

8M

S3 Savage IX

Trackpoint

19.8mm by 262mm by 231mm

1.55kg

Two Type II or one Type III

24x external kit

Yamaha XG Sound Processor

V.90

11.3in TFT

1,024 by 768

1,024 by 768

Li Ion

Windows 98

USB, IR, headphone, microphone,

external display, RJ-45 Ethernet,

RJ-11 modem connector

47.6

2,666.7

2,350

7,926.7

156.3

429.3

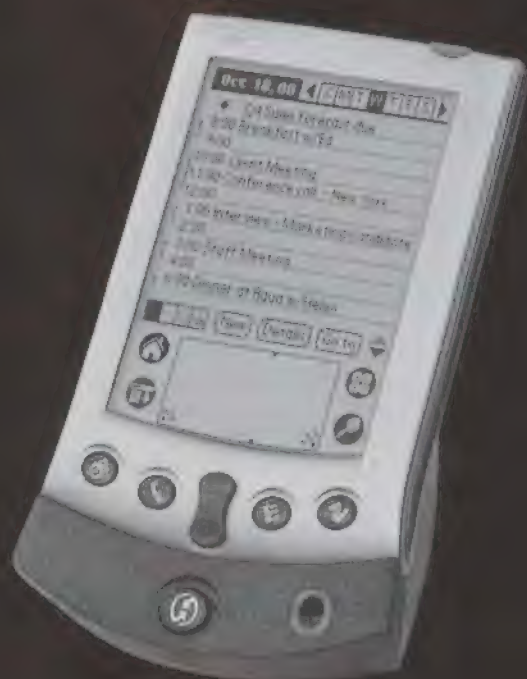
21.6

95

3:00

The products used in these tests are shipping versions available to the public at the time of publication unless otherwise stated. Information contained in this article is based on products and specifications supplied to APC by distributors at the time of writing. Readers should check current pricing and specifications with distributors. Winstone, WinBench and associated products are registered trademarks of the Ziff-Davis Publishing Company. These tests were performed without independent verification by Ziff-Davis and Ziff-Davis makes no representations as to the results. To test the battery, APM was enabled on all notebooks. All power-saving features were disabled. Notebooks require an internal resolution of 1,024 by 768 to run these tests.

Palm Vx



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Panasonic NV-DS55A

The growth in home video production is astounding. APC has covered digital video editing hardware and software in previous issues (see APC March, page 116, and April, page 99), but the main factor behind the flourishing home video production sector has been the increased availability of high-quality video cameras.

Digital video has particular benefits for PC owners. Rather than relying on expensive video capture cards, most digital cameras allow direct image capture using USB or FireWire/IEEE 1394 connections. The super-small NV-DS55A from Panasonic is the latest entry in this field.

One of the product's main selling points is its capacity for multiple uses. Apart from recording digital video, it can act as a digital camera, either by capturing single frames of prerecorded footage, or by direct capture while in filming mode. Inadvertent hand shaking occasionally meant it produced poor results, but the option is still useful.

Captured images can be saved to a flash memory card, which Panasonic has named the Multimedia Card. This is very similar to a product available for some time with Sony's DV range, known as the Memory Stick.

The card supplied with the camera is 4M, which allows you to capture 28 images. Larger capacity cards (8M and 16M) are available. Tying in with the digital media card are optional PCMCIA adaptors and an external Multimedia Card drive to connect via a parallel port. On the test machine, the parallel port already had to deal with a Zip drive and

scanner. Somehow, they all got along fine, once drive letters were assigned to the Multimedia Card and Zip.

The PCMCIA connection is simpler, because Windows recognises the Multimedia Card as a removable hard drive. However, Windows wouldn't recognise the PCMCIA card holder properly unless the Multimedia card was inserted into it. It was also unclear which direction the card needed to go in. Transfer times were quick — the average picture was not more than 100K in 640 by 480 JPEG format. Unwanted pictures can be deleted, either from within Windows or using the onscreen menu in the camera.

Video filming quality is high. The camera controls are reasonably well placed, especially considering the small size of the camera. The camera comes with a flip-out viewfinder as well as the more usual lens arrangement. One impressive feature is that images can be viewed mirror style if the viewfinder is flipped outwards (so that it faces out from the camera, for viewing and filming yourself at the same time).

The camera connects to external devices (PC, VCR) through a breakout box with options for FireWire, RCA connectivity or S-Video cable. A credit card-sized remote control, ideal for losing behind the sofa, is also provided. The battery uses a recharging unit, which works quickly. About 15 minutes charging will give one hour of battery life. However, the battery life depends largely on the level of film quality you opt for. If you're willing to sacrifice quality, the battery will last longer.

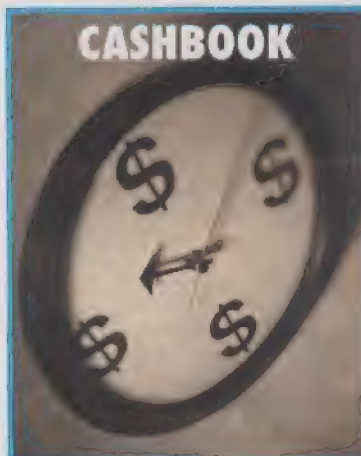


Whichever way you turn the camera, there are more controls, panels and switches. The onscreen menu selection button was hard to reach when holding the camera with one hand, but every other function, from zooming to recording to picture taking was easy to operate. Zooming is especially well balanced; the camera did a very good job of retaining correct focus even on extreme zoom changes.

Above all, the NV-DS55A is a lightweight camera; it's just under half a kilo without a tape. It's not cheap at \$3,199 (more if you want the PC extras), but you do get a lot for your money.

Alex Kidman

Contact	Panasonic
Phone	13 26 00
Online	http://www.panasonic.com.au/
Price	\$3,199
In short	It's small, packed with features, and a lot of fun to use, if you can afford it.



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SONY



Burns CDs **fast.**

If you want a fast drive, take one of the new Sony CRX CD Writer/ReWriters for a burn. From the inventors of CD-ROM technology, they feature lightning quick recording speeds along with fast 32x playback. Combine this with Sony's custom laser technology and optimum power control circuitry and you'll enjoy high fidelity recording, low power consumption and exceptional durability. IDE and SCSI models are available as kits, complete with pre-formatted media, cables, software and easy to follow installation instructions. For more information, check out www.sony.com.au or call 1800 226 429. **It's a Sony.**

10x
RECORDING SPEED



Tektronix Phaser 850DX

Printers rarely feature among products that make you say 'wow'. They're useful and practical, but printers aren't exactly renowned for getting your motor running. That is, unless the printer in question introduces an interesting new technology. Enter the Tektronix Phaser 850DX, which boasts high-performance solid ink technology to rival even the best quality colour laser printer.

Laser printers are excellent for monochrome print jobs, but printing colour can take up to four times as long. The difference with the Tektronix Phaser 850DX is that it is specifically designed for colour print jobs and can print colour at 14 pages a minute. It also makes photo-quality images possible on standard copy paper.

The solid ink blocks slot easily into the top of the printer and last for approximately 1,100 prints. One of the printer's best features is its ability to take additional blocks at any time without interrupting

the printing process. This is particularly helpful if you have a hefty document to print and are worried about running out of ink in the middle.

The printer is aimed at businesses, as reflected in its excellent networking features. To connect the printer to a network, you run a CD and follow the usual steps. You don't need in-depth knowledge of networking to see this process through to completion.

The Tektronix Phaser 850DX takes a long time to warm up — about half an hour. This is due to the time it takes to melt the ink blocks prior to printing. On the upside, the screen tells you how much warm-up time remains in both minutes and percentages, so you always know what it is doing.

The Tektronix Phaser 850DX is a high-quality and intelligent printer that knows its place in the office food chain — everything has been kept to a minimum to



ensure that you don't spend any more time printing than is necessary.

Fiona Williams

Contact	Tektronix
Phone	(02) 9888 0100
Online	http://www.tek.com/
Price	\$8,626 (\$330 for a 5 colour/2 black refill pack)
In short	An excellent colour printer that is easy to operate.

Adaptec AAA-UDMA RAID card

The AAA-UDMA RAID card is a PCI RAID (Redundant Array of Independent Disks) card that can RAID up to four IDE drives simultaneously. This is ideal for smaller businesses that want to create an entry-level server. The savings over a SCSI RAID system are not that great, but if you're thinking of scrapping a few office machines, you can scrounge their parts to create a decent server. IDE drives are also much cheaper than SCSI.

The card only works with UDMA 33/66 drives (and you can mix types), but be

careful — APC initially tried to use two old 2G drives, but they were too old to be recognised by the card. Maxtor came to the rescue with two identical DiamondMax VL30 30G drives (\$430), which worked fine. Setting up and configuring the card was straightforward once we figured out that the 2G drives can't be seen. Adaptec includes its CIO Management software to further simplify things.

This software allows you to create arrays easily, and to configure existing arrays.

The drives were tested in an old server machine and the RAID card was tested in two configurations: with both IDE drives mounted in a single RAID0 array, and with the two drives acting as separate arrays. We also used the machine's SCSI drive for comparison.



son. Ziff-Davis WinBench 99 hard disk tests were run and a 228M file was copied from drive to drive and to folders within each drive. As you can see from the test results, the system worked extremely well with the two drives in RAID0 configuration. This provides greater flexibility and security, as well as extra speed, because it reads from both drives simultaneously.

Darren Ellis

Contact	Tech Pacific
Phone	1300 654 534
Online	http://www.adaptec.com/
Price	\$1,140
In short	If IDE RAID suits your needs, then this card is a good bet.

Test

SCSI drive: copy file from one folder to another
RAID0 array: copy file from one folder to another
IDE A drive: copy file from one folder to another
Copy file from SCSI to RAID0
Copy file from RAID0 to SCSI
Copy file from SCSI to IDE A
Copy file from IDE A to SCSI
Copy file from IDE A drive to IDE drive B

RAID0 Business WinMark 99
RAID0 High-End WinMark 99
IDE A Business WinMark 99
IDE A High-End WinMark 99

Time to complete (minutes:seconds)

1:54

1:29

1:41

0:44

0:43

0:50

0:44

1:12

Bytes per second

3,490

7,940

3,170

6,970

WinFast Graphics, activating the Millennial Evolution

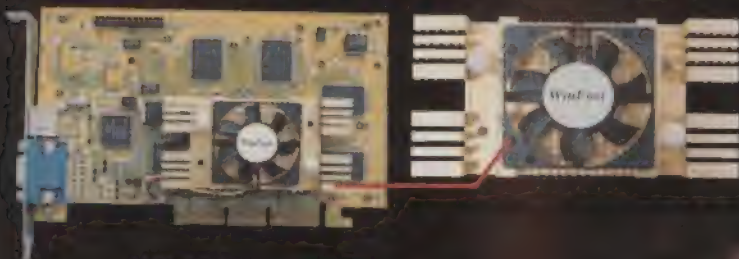
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2D Pro Application	Photoshop, Illustrator, CorelDraw
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3D Games	3D Games
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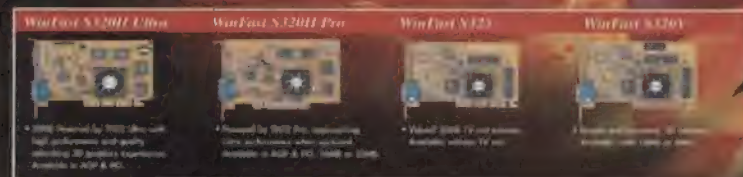
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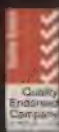
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Wake me up before you GoConnect

I registered with GoConnect in early February, lured by the promise of 'free 24/7 unlimited Internet' with a similar or better quality of service as Telstra Big Pond. I was assured that GoConnect would be fully operational by mid-March 2000.

I also asked whether the connection process would be available online or via connection CDs sent out by GoConnect, and was told both methods would be available.



I decided to accept the CD and was informed that it would be sent out within a few weeks.

It is now mid-May and I still haven't received the CD. The only thing I did receive was a letter some weeks back informing me that there had been an overwhelming response to GoConnect's advertisements, which has created a backlog.

I have been watching the progress of GoConnect via advertisements in major PC magazines, newspapers and on the Net. Today I visited the GoConnect Web page and saw a message saying that people who had nominated to receive a CD will have a further wait of "several months".

This is unfair, unethical and unprofessional, especially in light of GoConnect's

aggressive advertising claims. I doubt it can challenge Big Pond. GoConnect cannot even deliver its software on time, let alone provide a high-end ISP service.

When are these types of organisations going to start getting their act together before they make outrageous claims about high-quality service? Are we victims of yet another fly-by-night ISP promising everything but unable to deliver?

Internet service providers should be held accountable for the quality of actual Internet provision, the quality of customer service and general setup to connection. I am still waiting for the GoConnect Internet connection promised back in early February, but now I believe I will be disappointed.

Peter Mannu
Internet

Ed note: Peter Mannu is not the only person who's had this problem. Check out the news story on page 26 for details.

Stop yer whingeing

I'm writing in response to the letter 'Willing and cable?' (see APC May, page 52).

It concerns me that a letter from a person who has such a limited understanding of cable Internet service would be published. I work for Telstra, and while I am by no means a fan of its services, I feel compelled to say something.

For a start, the Freedom plan on the cable service is capped for a very good reason. It is there to protect and maintain the high speed provided to existing users. The cable network is a shared network. Allowing customers full access to the 10Mbps network on an unlimited plan slows down the service for all users.

Second, streaming video can quite easily be viewed at a transfer rate of 368Kbps, which means that 400Kbps is perfectly acceptable. Both the satellite and cable options can provide this speed.

Third, are we so far removed from the world that we don't remember our 56Kbps modems? I don't even have access to the cable network, and am still waiting for ADSL. However, people in rural areas are far worse off than the rest of us; most of them can only connect at 9.6Kbps, so any

THREADS

from APC's Web sites

Microsoft bashers and OS evangelists came out of the woodwork over the love bug and gave "MS" a serve on our Web site forums. Frequent Sounding Board poster Graham G wrote:

The "love bug", another great reason not to use MS products. That'd make 65,001, wouldn't it?

For Microsoft, of course, the ability to access Outlook address books through COM (and therefore VBScripts) is a feature, not a bug.

One anonymous poster blamed the whole situation on Microsoft's design philosophy. As its user-friendly approach encourages the layperson to use computers, Microsoft is to blame for the spread of the virus:

As Microsoft is trying to make the PC into a consumer appliance, I think it bears the responsibility of letting you know your risks.

Another poster, Anonymouse [sic], echoed this viewpoint:

Their design = their blame.

A poster going by the handle The Usher of the Black Rod (we don't want to know what that means) did bring some sense to the thread with this posting:

What a load of hooey! There are viruses for just about every scripting language... there's even a virus for CorelDRAW's scripting language! Are you seriously suggesting that vendors label their products 'this software contains elements that could be used by viruses, therefore don't do any of the following...'?

Want to put across your view, or see what other readers have to say? Join the discussion at <http://apcmag.com/interactive/> and <http://newswire.com.au/sboard/>.

service that provides even 64Kbps would be a welcome relief. I wonder at the mentality of people who have access to cable services which are eight or more times faster than the rest of us have, a constant connection with no dialup charges, at a price which is quite reasonable, and who still whinge. Wake up.

Name withheld
Internet

I'll take mine over easy

In reply to the letter 'Frying our brains' in APC May, I believe the author has chosen to dismiss the most important specification when evaluating the "dangers" of using Bluetooth technology.

A quick check on the Net at <http://www.bluetooth.com/> gives the transmitter output power for these radios:

Class 1: maximum 100 milliwatts
Class 2: 2.5 milliwatts
Class 3: 1 milliwatt

For class 1, the power must be adaptive so that when a strong signal is received by the radio, it will reduce its output power accordingly to use the minimum power necessary for reliable communications.

To put these power levels into perspective, compared to a 600W microwave oven, class 1 is weaker by a factor of 6,000; class 2 is 240,000 times weaker; and class 3 is 600,000 times weaker. When you also take into account the Inverse Square Law regarding radiated power, which states that at every doubling of the distance from the transmitter antenna, the received power has fallen to a level of 25%, it is not hard to see that starting with very low levels as per the specification and then looking at realistic distances when the equipment is in use, the power levels received by the human body are going to be insignificant. Also, the signal is not continuous. The transmitter is only turned on to send data bursts, so the average power is minuscule.

As a technician in the two-way radio industry for over 30 years, I would far rather be in the vicinity of a Bluetooth device than many of the radiating devices that modern society has surrounded us with.

I hope this information allays some of the unfounded fears.

Andrew Beales
Internet

The haves and have-nots

I read with interest all APC's articles regarding broadband access to the Internet, knowing that if it ever reaches me, 98% of Australians will most likely have had unlimited 60Mbps for the last 10 years. Unfortunately, I'm one of those people in the 10% who aren't covered when any telco states they cover 90% of Australians. Note they say Australians, not Australia.

I sit here forever downloading at 19,600bps (if I'm lucky), with no local call access to an ISP. Yes, I know I can have satellite access, but have you checked the cost? And you still have to have an ISP to upload. Or I could use Big Pond Rural Access and spend almost the entire two hours a month you get downloading one MP3. Or I could make the trip to a local library and use the free service, which is no help if I want to upgrade any of the programs sitting on my hard drive, or spend more than half an hour at a time. I've never been able to listen to any RealAudio, for instance, and I don't download any files over a couple of meg unless I really want them.

The trouble I can see is that as broadband access becomes more common in the cities, Web designers will fill their pages with streaming video and sound with heaps of graphics and I'll never be able to see it. You are already starting to get this as permanent cable connection becomes more common in the major cities. Before upgrading the major population centres, surely the people in the bush deserve to have what's available to the rest of the country? After all, we're the ones who can't go a couple of blocks to the local shopping centre to buy something, and need the contact and access that the Internet can supply.

David Hill
Western Creek, Tas

Ed note: Just so he can store all those MP3s he might one day be able to download, APC has decided to give David Hill our reader prize: an Ultra160 SCSI controller from Adaptec and a 9.1G Ultra160 drive from Quantum.

Messaging evangelism

I found your evaluation of instant messaging services inconsistent (see APC May, page 89). The problems you encountered with the basic features of PowWow were not evident at all with ICQ. The only problem with ICQ appeared to be navigating with the icons, which become clear with use. Yet you still rated ICQ second. The fact that PowWow

has compatibility with MSN Messenger, but only for those with a current MSN account, is no great surprise. However, the fact that APC and MSN are controlled by the same parent company leads one to be suspicious about your comment that chatting with MSN Messenger users was a 'resounding success'. In fact, this comment seems to be the only 'major' plus for PowWow.

In conclusion, I think to say that PowWow is the best instant messaging tool currently available is a gross exaggeration. I am a newcomer to computers and the Internet and have bought APC's last few issues to use as an introductory guide. However, I find at the very least, this lack of objectivity a good reason to review my selection.

Roger Chambers
Internet

Ed note: APC is published by Australian Consolidated Press, which is owned by PBL. ninemsn (not MSN) is a joint venture between Microsoft and ecorp, which is also owned by PBL. We must say that Roger Chambers' leaps of logic astounded us. If APC's reviews were biased towards Microsoft, why didn't we just award Editor's Choice to MSN Messenger?



Correction

● In APC May, page 98, it was stated that the original IBM PC used an 8086 processor. This is incorrect: the first IBM PC used Intel's 8088 processor, an 8-bit processor with 16-bit memory bus. Thanks to reader James Wolz for pointing this out.

● The review of the Hewlett-Packard Jornada 545 Pocket PC (see APC June, page 46) stated that the screen can handle 64,000 colours. This is incorrect, as the device is currently limited to 4,096 colours.



Sydney to Hong Kong, non-stop.

OBJECTIVE: To build the fastest possible ultra-portable computer and make it work all day unplugged.

PROBLEM: Heat is the enemy of electronics. The faster the processor, the more heat it generates, so cooling is essential. However, cooling systems take space, so squeezing a very fast chip into a super-slim machine required a breakthrough.

SOLUTION: Toshiba invented a passive cooling device that uses water at one-third atmospheric pressure to draw heat directly from the processor and dissipate it via the magnesium alloy frame and case. An innovative centrifugal fan minimises battery drain by cutting in only when required. Cool, eh?

RESULT: The new Portege 3440 fitted with a high capacity battery can work at 500MHz for up to 9 hours straight, with no breaks for meals or a movie.

FEATURES: B5 footprint (26.5cm x 23.1cm) – smaller than A4. 20mm thin. 1.55kg (+ 1 kg optional high capacity battery, pictured). 11.3" TFT poly-silicon screen (another Toshiba invention, but that's another story).

SPECIFICATIONS: Intel® Pentium® III processor 500MHz /up to 192Mb RAM/5.6Gb HDD/8MB VRAM/3D graphics/56K V90 international modem/multimedia expansion options.

CONTACT: Your Toshiba reseller, visit www.isd.toshiba.com.au or call 1800 021 100.

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TOSHIBA



Computer technology influences almost every aspect of our lives — but try finding a decent song about it.

Calling the tune

Angus Kidman

Angus Kidman is editor in chief of APC and Newswire. He can be contacted at akidman@acptech.net. Angus' DisGust column is published Tuesday to Friday every week at <http://newswire.com.au/disgust/>.

As an experiment, I wandered around the APC offices and asked people to name the best song they knew about technology. Almost without exception, I received the same reply: "Com-pute-pute-pute-pute-pute-pute-pute-pute-pute-pute-pute-pute-puter games!"

Now, I'm as fond of Mi-Sex's 1980 classic as the next person, but the fact that this song was released two decades ago is a little disturbing. Computers have become a central aspect of all our lives. Popular music is supposed to be some kind of reflection of the times we live in, and these days a large proportion of music is recorded and produced using computers. Why aren't there more halfway decent (or even just well-known) songs around technology themes, such as your hard drive crashing or your Internet addiction? Is there ever going to be an album called *dot compilation* featuring these tracks, or, are we destined (a brief burst of songs about arcade games in the early 1980s aside — remember 'Space Invaders' by Player One and the inevitable 'Pac-Man Fever' by Buckner & Garcia?) to hear nothing but more sappy songs about romance?

Sadly, it seems the answer to that question is yes. Scanning through my CD collection (which is hardly representative, but it is extensive), there are only a handful of songs which even vaguely refer to PCs, and most of them aren't particularly well known.

Kate Bush gets psychic prediction points for a 1989 track entitled 'Deeper Understanding'. Written when the Web was still a glint in Tim Berners-Lee's eyes, the song details something that sounds scarily like Net addiction: 'As the people here grow colder/I turn to my computer/And spend my evenings with it like

a friend.' Inevitably, this leads to problems: 'I had never felt such pleasure/Nothing else seemed to matter/I neglected my bodily needs/I did not sleep/I did not eat/The intensity increasing/Till my family found me and intervened'. Some years later, Kate collaborated on a song entitled 'My Computer' with the Artist Formerly Known As Prince, so she's stuck with the theme, even if the latter hasn't.

Some tech references are just lame attempts to cash in on a trend. Teen idol Britney Spears has a track on her first album entitled 'Email My Heart', but stripped of the stupid technology gimmick, it's simply an assembly-line power ballad. Equally vapid are the many artists who decide to name their albums after their Web sites (Marillion, Pitchshifter and DJ Bobo are all guilty). TISM therefore get bonus parody points for titling an album www.tism.wanker.com.

Amid all these poor efforts, there are occasional moments of sheer poetry. UK singer Kirsty MacColl has a track entitled 'Here comes that man again' on her current album *Tropical Brainstorm*. In a wry and knowing tone the song details cyber-sex encounters with an anonymous Dutchman who sells porn for a living:

*He says the camera is on and
Can I see him yet?
I say "No babe you look like a ghost
And sound like a Dalek to me"
So let's go back to the written word
Even though we both know it's absurd*

Of course, it's typical of the world we live in that practically no-one has heard of MacColl, while Britney's 'slop pop' has sold to teenagers worldwide. But then how surprising can that be, when we're all still using Windows?



hp netserver e60: Featured with dual Intel® Pentium® III processors 550 MHz For more information, visit www.hp.com/pc-au



**If your computer is
not your most
reliable employee,**

fire it.

Get angrier when your computer crashes.

Stop accepting "the server is down" as a legitimate excuse.

It's time to change the level of reliability you accept from computers.

Demand a better computer.





Jeremy Horey

Jeremy Horey is a senior consultant with Com Tech Online. He can be contacted at jhorey@comtech.com.au.

It seems viruses are here to stay.
So what can we do about it?

A negative Outlook

Who was surprised by the love bug? Judging by the disruptions, a lot of people were, but they shouldn't have been. This sort of virus is not new and it is possible to take steps to prevent its dissemination.

Only 12 months ago I wrote a column arguing that software developers had a responsibility to make their software more resistant to viruses like Melissa. The Melissa virus was a wake-up call, but it's a pity no-one heard it.

We now have another chance and this time we should take it. The problems caused by the love bug were considerably worse than those caused by Melissa, and the next email virus could do even more damage.

The facts are simple. Virus writers are not going to go away. No matter what laws are introduced in the US or Australia, they will not deter people from producing viruses. There will always be at least one country, if not many around the globe, where virus writers will find a refuge.

We also have to live in a world where more computers are becoming increasingly connected. They also exchange greater amounts of information, so the opportunity for viruses to spread is growing too.

I would suggest that it's time to look at some fundamental measures for making computer systems more resistant to viruses.

Virus software has always been an add-on, which means that it's optional for most users, leaving many unprotected. At the same time, major software developers such as Microsoft continue to ship products that are wide open to attack.

Application-specific viruses have proven to be the most widespread and difficult to control. The Word macro virus has been around for a long time. While most variants are irritating rather than overtly destructive, they eat up far more time and

effort than viruses that are harder to detect and more destructive, such as the Michelangelo virus.

Now that most people are aware of Word viruses, and the latest versions are better protected, virus writers have turned to Microsoft Outlook. Outlook email viruses have spread like wildfire. In doing so, they've clogged email servers and caused more problems than earlier viruses.

We need protection from the next wave of viruses before they strike. While operating systems have grown, adding all sorts of extras, virus protection has been neglected.

Perhaps it was hoped that the problem would just go away. But the time has come to build operating systems, utilities and applications from the ground up with viruses in mind. No manufacturer should ship a product which allows any form of executable code to run if that executable was not loaded through a CD-ROM drive.

Of course, there would need to be varying levels of protection for different situations. This already happens in some areas, and should be extended to all commercial software.

Web browsers provide a good model; they isolate the code that is downloaded into controlled environments where it can't do any damage, even if it is written with malicious intent. Although Web browsers have had security problems in the past, they are remarkably robust when it comes to malicious attacks.

How much more confident would you feel if you could secure your system to a level that suited your risk and exposure, as you can with your Web browser?

It is time that we demanded more from software manufacturers. The next round of software upgrades should deliver real value by making it impossible for virus writers to crash mail servers or delete files.



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Everyone knows the Net is full of porn. Why isn't MP3 getting the same coverage?

MP who?

Jeremy Torr

Jeremy Torr is a contributing editor of APC. He can be contacted at jeremy@enternet.com.au.

Here's an interesting test: stop anyone on the street, from granny to urchin, from mother-of-four to yuppie broker, and ask them what they think is the most common word people search for on the Net. In most cases the answer will be 'sex'. And they will be right.

Repeat the question, but ask them what the second most common word is and they'll probably come up with something silly like 'sport', 'virus', 'beer' or 'travel'. No way. At the moment, according to many reports, the second most common search term is MP3. Visit any site or portal and there, right next to the search bar, will be a hot button marked 'MP3'. And it certainly gets clicked a lot.

Although people know all about the pervasiveness of sex on the Net, why don't they know about MP3? They haven't been told, that's why. Switch on the news or read any paper and there will be the usual headlines about nerdish predators and porn peddlers, but strangely enough the media is completely ignoring the fact that almost as much Net traffic is being generated by young people simply doing what generations of young people have always done — listening to the music they want.

Could it be that the people who control the media are being less than generous with information that could prejudice their income stream or their associated companies? Could it be that MP3 is getting less exposure than it deserves simply because the media and the music industries are close bedfellows?

Sure, a huge amount of MP3 music on the Net blatantly abuses copyright laws, and programs like Napster are making the job of sharing that music easier all the time. However, a huge amount of the latest music being put on the Net is produced by amateur musicians who stand

a snowball's chance in hell of getting listened to in any other way.

There is no way these small bands will get a hearing from the record companies because they simply don't have the earning power of Shania Twain. But if you ask around, the majority of MP3 users don't have hard disks full of Shania's warbling. They often have exotic, hard-to-get tracks from overseas bands. Or old tracks that the record companies don't release, again because they don't have the earning power.

It's possible that the average person doesn't know about the convenience and appeal of MP3s on the Net, because tight-lipped music barons fear a huge shift away from conventional audio CDs, and a consequential loss of control over music distribution. Before you wag the legalistic finger at naughty MP3 users, though, ask yourself: do you ever record anything off the TV onto your VCR? That's illegal. Ever heard a top-selling record which features a catchy sample from some other source? Again, without permission, that's illegal. People do all these things every day in their hundreds of thousands.

The companies that collude in this (even though they are the same companies associated with the remarkable absence of MP3 publicity) are not making waves because they can make money out of it.

Just because a system doesn't follow a standard retail model doesn't mean it can't work. For example, shareware was rescued from oblivion by the Internet.

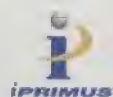
There's no reason why MP3 music can't go the same way, as long we all know about it.

For a complete archive of APC Two Bits columns, see <http://apcmag.com/twobits/>.



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The current range of Intel processors is very confusing, but Price Watch is here to help you sort them out.

Gathering some Intel

Choosing a new CPU has always been confusing, and if you've followed recent trends in chipset and processor development, you'll know that it isn't getting easier. New pitfalls have developed with the move from the 100 to 133MHz frontside bus (FSB) and the retrograde shift from slot to ZIF-style pin grid array CPU sockets.

A motherboard's FSB is the speed at which the memory and CPU communicate. Intel processors always operate at multiples of the FSB to generate their ticketed speed. For instance, a 400MHz CPU can run on a 100MHz FSB with a 4x multiplier.

Owners of older motherboards with slower buses will face the most obstacles on the CPU upgrade path. If you have one of the original model Pentium II proces-

sors, there is a good chance that your motherboard's FSB is only capable running at 66MHz. If this is the case, the fastest processor you can upgrade to is a Slot 1 Celeron 433—a product no longer widely distributed by Intel and consequently very difficult to find. If your PC's manufacturer had the foresight to install a motherboard capable of supporting 100MHz or 133MHz bus speeds in your system, the picture is much rosier.

The fastest Intel processor capable of running on a 100MHz FSB is the 850MHz Pentium III. Faster processors need a motherboard capable of a 133MHz FSB.



Check in the motherboard manual or with your PC manufacturer for the maximum capability of a particular system.

Any motherboard that's capable of running an FSB at 133MHz is also capable of running at 100MHz. If you can't afford a processor that requires a 133MHz

bus, you can always buy a 100MHz FSB processor and upgrade later.

As you can see, Intel now uses some weird notation on its Pentium III processors. If a processor has an 'E' in its designation, it is one of the more recent 'Coppermine' chips with the level 2 cache embedded on the processor that runs twice

Retailer	Contact	Product	Type	Speed (MHz)	Bus speed (MHz)	Price
EYO Technologies	(02) 9775 4888 http://www.eyo.com.au/	Intel Pentium III	FC-PGA (Socket 370)	800EB	133	\$1,325
		Intel Pentium III	FC-PGA (Socket 370)	800	100	\$1,299
		Intel Pentium III	FC-PGA (Socket 370)	600EB	133	\$514
		Intel Pentium III	FC-PGA (Socket 370)	600E	100	\$548
		AMD Athlon	Slot A	600	100	\$405
		AMD Athlon	Slot A	700	100	\$479
		AMD Athlon	Slot A	800	100	\$793
		AMD Athlon	Slot A	1000	100	\$2,598
MicroStructure	(02) 9790 4019 http://www.microstructure.com.au/	Intel Pentium III	FC-PGA (Socket 370)	800E	133	\$1,465
		Intel Pentium III	SECC2 (Slot 1)	600E	100	\$541
		Intel Pentium III	SECC2 (Slot 1)	650E	100	\$657
		Intel Pentium III	SECC2 (Slot 1)	700E	100	\$858
		Intel Pentium III	SECC2 (Slot 1)	733E	133	\$898
		AMD Athlon	Slot A	600	100	\$422
		AMD Athlon	Slot A	800	100	\$818
		Converter SECC2 to FC-PGA	N/A	N/A	N/A	\$22
		Athlon CPU Fan	N/A	N/A	N/A	\$33
Rite Price Computers	(03) 5672 4887 http://www.ompac.net.au/~rpc/	Intel Pentium III	FC-PGA (Socket 370)	800	133	\$1,237
		Intel Pentium III	FC-PGA (Socket 370)	750	100	\$1,178
		Intel Pentium III	SECC2 (Slot 1)	667	133	\$600
		Intel Pentium III	FC-PGA (Socket 370)	600(E/EB)	133	\$541
		Intel Pentium III	SECC2 (Slot 1)	550	100	\$515
		AMD Athlon	Slot A	600	100	\$396
		AMD Athlon	Slot A	700	100	\$487
		AMD Athlon	Slot A	750	100	\$593
		AMD Athlon	Slot A	800	100	\$775

About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept responsibility for errors or omissions. The responsibility rests with sales staff to provide adequate information, as their employer would expect them to do with every customer. Readers are advised to always obtain a written quotation prior to making any major technology purchase.

as fast but is half the size of the cache in the other processors. For most purposes, a processor with an 'E' is about 10% faster than a standard processor at the same clock speed.

A 'B' in the name denotes support for the 133MHz FSB for processor speeds at which there might be variants running on both 100MHz and 133MHz buses. At 600MHz, for instance, there are processors that run at both 100MHz and 133MHz FSB. If your motherboard and memory support it, it's better to get a 'B' processor than a standard processor. Intel doesn't use the 'B' designation on processors that don't have an equivalent 100MHz FSB processor.

Finally, even if a motherboard supports a 100MHz or 133MHz FSB, it may not be able to run any processor listed for that speed. Many have clock multiplier limitations — for instance, a 100MHz board might have a limitation of a 7x multiplier, limiting that system to 700MHz processors.

If you're interested in getting a cheaper Celeron processor, Intel now produces the processor only for Socket 370 motherboards. All variants run on a 66MHz FSB. Intel currently sells 466, 500, 533, 566 and 600MHz Celeron processors. The 566, 600 and a variant called the 533A incorporate SSE instructions, making them feature-compatible with Pentium III processors. The others only have the same features as the Pentium II.

Slot 1 Intel Pentium III processors for a 100MHz FSB:

450, 500, 550, 550E, 600, 600E, 650, 700, 750, 800, 850

Slot 1 Intel Pentium III processors for a 133MHz FSB:

533EB, 533B, 600EB, 600B, 667, 733, 800EB, 866, 1.0GHz

Socket 370 Pentium III processors for a 100MHz FSB:

500E, 550E, 600E, 650, 700, 750, 800, 850

Socket 370 Pentium III processors for a 133MHz FSB:

866, 800EB, 733EB, 667B, 600EB, 533EB

We haven't covered AMD processors here — we'll save that for a future Price Watch, but the prices are listed (below left).

For a complete archive of APC Price Watch columns, see <http://apcmag.com/pricewatch/>.

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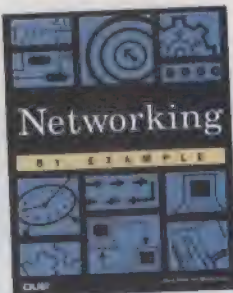
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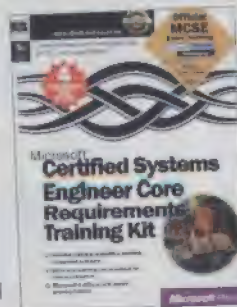
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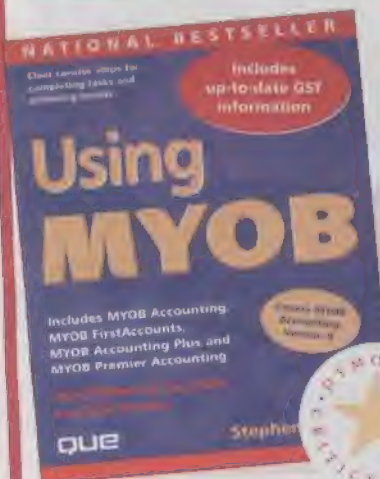
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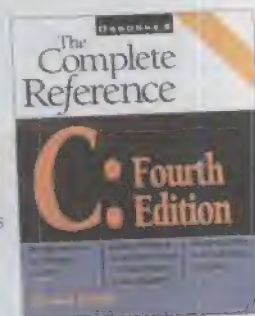
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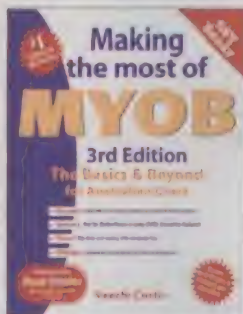
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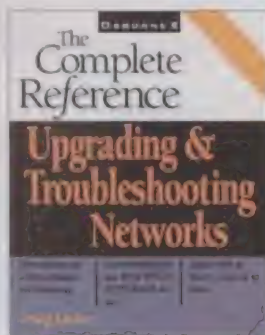
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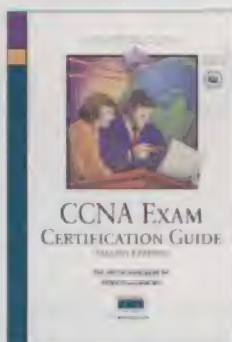
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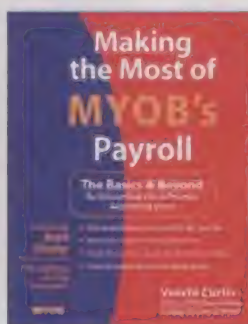
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Getting a faulty product repaired or replaced is hard enough without getting the run around. **By Roulla Yiacoumi**

Promises, promises

APC recently received the following letter from a reader.

Dear APC,

Last December, I decided to buy myself a new USB modem. I approached my supplier and enquired about an Australian-made product. It told me about one called Little Devil, which I purchased on the same day. It came with Telstra Big Pond free Internet hours, which was handy as I was going on holiday and could use my new modem and the Internet access hours.

When installing the modem it took a very long time to connect, and then cut out quickly. It was late so I didn't think about it and went to bed. When I tried again the next day, it took even longer to establish a connection and still kept disconnecting me.

I suspected that I was doing something wrong, so I called Big Pond for support. Eventually I was informed there was something wrong with my modem. This is where my problems started.

Recall Notice

The Australian Competition and Consumer Commission (ACCC) has forced AusLinx to recall a batch of potentially dangerous modems.

ACCC found the modems did not comply with Australian standards and could expose users to "unacceptable danger as a result of a power surge". The power surge could also damage computers and networks, the ACCC said.

The recall only applies to the AusLinx ABC V.90 56K external modem. Over 5,000 have been sold in Australia.

Affected customers are entitled to a replacement or a refund. Call 1300 655 675 for details.

I called the modem's distributor, AusLinx. The technician told me there was a problem with the drivers for this modem and that he would send me the new drivers immediately. I patiently waited a few days but received nothing, so I called again.

This time, the office was closed and an answering machine told me that it would not be open for three weeks. This



meant I lost all my extra Internet hours which I had purchased for my holiday.

When the office reopened I rang and spoke to a very nice person who apologised and offered to send me all the promised software, as well as 100 hours of Internet access with OzEmail. I informed her that I could not use this as I live in the country and access requires a long-distance call. She then offered me a Big Pond CD with 100 free hours. As I already had an account with Big Pond, these were also of no use to me.

A couple of days later, a single floppy arrived with a note that read: "To Fred [my name is Alfredo], Regards AusLinx." There were no instructions. I tried to install the BIOS flush and it worked surprisingly well — the modem flushed itself out and never worked again.

Again, I called AusLinx. Another nice person talked to me and again apologised, offering me the same things I had been offered before. She suggested that I send the modem to AusLinx so it could assess the problem. I said that I would return it to my retailer.

I had heard nothing by February so I called again saying that I wanted to talk to the manager. He was busy and could not talk to me. I was offered another Little Devil which I refused.

Eventually I talked to Tony (I assume he was the manager) and he said he would send me a new Little Devil. I said I wanted my money back.

I would not like any of your readers to experience this.

Alfredo Bonora
Emerald, Qld

APC forwarded this letter to AusLinx and received the following response.

Dear APC,

AusLinx is troubled by this customer's situation. I would like to personally apologise to Mr Bonora in a face-to-face meeting and supply him with either a refund or replacement and an additional gift to compensate for the trouble he has experienced.

This is conditional on the customer supplying in advance the serial number of the modem which may be faulty, the name of the supplier he purchased the modem from and a copy of the purchase receipt.

We believe that this trouble has been instigated by a rogue employee who is no longer employed at AusLinx. AusLinx is proud of the quality service it provides to our customers. Occasionally a problem occurs, but AusLinx's policies and procedures are designed to deal with these if adhered to internally.

Perry James Brennan
AusLinx managing director

Have you had a similar problem with a product you have bought? How was the problem resolved? Email me at ry@acptech.net or write to Service & Reliability, APC, PO Box 4088, Sydney NSW 1028. Letters may be edited for length or clarity. We regret that all letters cannot be personally answered. For a complete archive of APC Service & Reliability columns, see <http://apcmag.com/service/>.

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Businesses can't afford to be conservative when it comes to outsourcing security and enterprise storage. By David Braue

Outsourcing breaks new ground

Although storage administration has long been part of outsourcing contracts, technical limitations — such as the paltry 2Mbps limit of most wide area network connections — have generally forced businesses to keep this storage onsite.

The rise of high-speed fibre-optic links across and between most Australian CBDs will resolve this issue. Long-haul fibre will connect businesses with outsourced storage arrays at speeds that will match — and eventually surpass — those of internal networks.

The concept has been available for over a year in the US, where Storage Technology helped kick off the market with the launch of its Storage Utility. Hewlett-Packard's recent corporate realignment around the concept of 'e-services' made an outsourced storage solution inevitable. It launched its own strategy last October after securing a partnership with US fibre provider Qwest. Both services offer a complete managed storage solution with contractual availability levels which can be accessed through a dedicated link, or over the Internet.

Infrastructure requirements for such services are enormous. Qwest estimates it will have 630,000 terabytes of Hewlett-Packard's SureStore storage online in a dozen US data centres by the end of this year. In May, EMC took a similar route by partnering with outsourcer EDS to provide the infrastructure for that company's new Managed Storage Services. IBM began testing its own outsourced storage solution in March, in partnership with Internet-based storage provider StoragePoint.com.

It's not clear when any of these services will reach Australia, but outsourcers may not want to wait too long. Analyst company Forrester Research recently predicted that corporate demand for storage would escalate from 52% annual growth in 1999, to well over 100% per year over the next few years. More than a third of the 54 online retailers surveyed by Forrester expect their storage to increase by a factor of 10 by next year. This growth will be equalled in conventional business environments as new applications are brought in by the truckload, after the lifting of Y2K-related moratoriums on deployment.



Forrester believes storage-related expenditures in the average Global 2500 company will increase from 4% of the IT budget last year, to 17% in 2003. If this prediction plays out, it's likely that businesses will quickly warm to the guaranteed service levels, regular backups and instant problem-solving associated with these services.

Outsourced security services, which are starting to be explored by a number of leading service providers here and abroad, may also take off. Take-up of such services needs more support in the business sector, as most businesses implementing new infrastructure prefer to keep security issues an internal matter. But this is slowly changing, said Peter Watson, managing consultant for security and privacy services with IBM Global Services Australia.

"We have definitely seen an increase in the number of requests from clients to look at outsourcing or outtasking the delivery of security services," he said. "A lot of companies in Australia never really had a security function in the past, so they're faced with the option of building it or looking to someone to provide it. But the whole pace of the market has changed, so finding people who fully understand the implications of those [security] components, and can maintain them inhouse, is a big task."

To fill this need, IBM GS recently launched its Internet Emergency Response Service (IERS). This is a package of security services that includes a per-incident emer-

gency response team, regular security audits, and an outsourced intrusion detection service that monitors business networks for signs of attempted break-ins and raises the alarm.

Businesses must keep staff on call to respond to these alarms. However, IBM G provides businesses with help installing the software and a monitoring service similar to the monitored alarm packages common in homes and businesses. If the alarm is raised, IBM GS staff can immediately cut the intruder's connection, or actively try to trace their identity across the Net. IBM GS will compete against Australia's leading service providers, such as Com Tech Communications, which started the local market in February with managed firewall, intrusion detection virus and content scanning services.

Compaq recently launched its own Internet Security Healthcheck service and may expand into security outsourcing if there is adequate demand. "We've had to look at the security environment as a whole and at how we might best address that from the customer's viewpoint," said Greg Edmunds, business group manager at Compaq.

Despite initial reluctance from businesses, outsourced security and storage solutions help reduce administration and will undoubtedly become popular.

For a complete archive of APC Corporate columns, see <http://apcmag.com/>.

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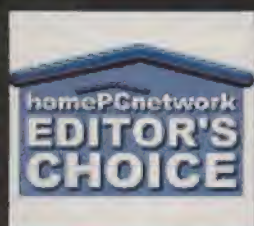
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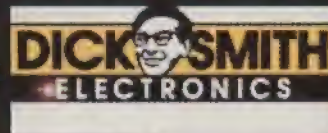


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More than 700 respondents completed the APC Service & Reliability Survey 2000, which posed many questions about APC readers' PCs and peripherals. This month, we publish the results of that survey. **By Steven Fear**

While some pundits go as far as predicting the demise of the PC as we know it, the staff at APC spend their days being reminded of just how alive it is. They see it in the constant search for greater clock speed, faster and better graphics, cheaper prices, and neater and more integrated features to cope with the demands of software and an increasingly aware consumer market.

It's obvious that consumers also want reliable products, good service and support. By 'service' we mean that service provided *after* an item is purchased, not just the bonhomie that features in pre-sales routines.

Of course, countless thousands of products do work faultlessly, and there are also many instances of unheralded customer service and support. To the companies responsible, APC salutes you; your customers thank you and will probably reward you with repeat business.

However, it's a fact of life that sometimes a product just isn't up to scratch.

Either it fails to perform as specified, or it fails to perform at all — which is very frustrating for the unfortunate consumer who purchased the dud.

Although product reliability is rapidly improving, any number of things can and do go wrong with PCs and their peripherals. Perhaps your notebook's screen dies when it's only three months old, you can't get a new modem to work with your PC, your printer suddenly won't work, or your PC's hard drive fails.

When this happens, you may need support from the manufacturer or the retailer. At this stage, good will towards the manufacturer is probably minimal, but still retrievable. In fact a prompt, courteous response to complaints can result in customers developing a warmer, fuzzier feeling for the manufacturer than they had in the first place.

Products offered for sale are subject to two tests. If a product doesn't perform adequately, by definition it has failed the first test. The second test is the qual-

ity of the product support required to right the situation.

There are any number of reasons for shoddy service and product support, but none are viable excuses. The IT industry has now moved past the point where immaturity is an acceptable excuse for substandard service. A mature IT industry is now the driving force behind the booming global economy, and consumer demand is behind much of it.

Consumers of PCs and peripherals are now entitled to products that work properly, and when they don't, to customer care equivalent to that in any other industry.

The conscientious, courteous and prompt management of customer concerns should be a high priority for manufacturers and retailers. In fact, in an industry where products and pricing are often very similar, exceptional service and support offers them the opportunity to distinguish themselves from competitors. Just as peripherals complement PCs, good service and support should complement PCs and peripherals.

PCs and peripherals

Do APC readers buy brand name PCs, or do they prefer clones? What are their peripheral preferences?

The survey asked respondents about the type of computer they use most often. Nominations were fairly evenly spread between brand name computers (27.9%), clone computers (26.9%), and self-built computers (24.8%). The corresponding results in last year's survey (see APC July 1999, page 82) showed slightly higher percentages using brand name and clone PCs, and fewer respondents (21.7%) using self-built computers. The increase in the number of people building their own computers makes sense, as PC users are becoming more familiar with the inner workings of their computers and more comfortable with the idea of self-assembly.

The next most common response to the question was for computers built from specified parts (13.5%). This was followed by 4.8% of respondents who nominated brand name notebooks. As was the case in last year's survey, a very low proportion (1%) of respondents with notebooks were clone users.

Almost half of the respondents told us that no brand name appears anywhere on the case of the computer they use most often.



When asked to specify the location and use of the machine they accessed most often, 48.1% of respondents nominated a home computer, 36.3% indicated a home computer sometimes or regularly used for work, and 14.1% nominated their work computer.

Intel dominates the processor space among APC readers; 25.9% of respondents said they use an Intel Pentium II-based PC, 24.6% use a Pentium or Pentium MMX, 16.5% have a Celeron, while 6.1% have a system based on a Pentium III. AMD's K6-2 runs on 7.7% of respondents' machines, while Cyrix has a 4.6% participation rate, and only 0.9% of respondents said their machine was based on an AMD Athlon chip.

What brands do APC readers use?

PC brands

- 1 Dell
- 2 Gateway
- 3 IBM
- 4 Compaq
- 5 Hewlett-Packard

Printer brands

- 1 Hewlett-Packard
- 2 Canon
- 3 Epson
- 4 Lexmark
- 5 Brother

Modem brands

- 1 NetComm
- 2 US Robotics/3Com
- 3 Banksia
- 4 Web Excel
- 5 KTX

Removable storage brands

- 1 Iomega/Zip
- 2 Hewlett-Packard
- 3 Quantum
- 4 Sony
- 5 Ricoh

Source: APC Service & Reliability Survey 2000

APC readers rate the brands

In order to rate the five most commonly used PC brands in APC's Service & Reliability Survey 2000 — Dell, Gateway, IBM, Compaq and Hewlett-Packard — the answers to the four questions below were weighted and a percentage rating obtained. Basically, the higher the percentage, the better.

1. How would you describe the customer support you received?
2. Has the equipment ever been unusable?
3. How would you rate the equipment for overall reliability?
4. Would you buy equipment made by the same manufacturer again?

For questions 1 and 3, the percentages of 'very good' and 'excellent' were added. For question 2, the percentage of 'no' responses was calculated, and for

question 4, 'yes' answers were counted. The four percentages were then averaged to reach our final results.

Dell	90.1%
Gateway	81.3%
Compaq	74.2%
Hewlett-Packard	73.6%
IBM	62.6%

Here are the results for the five brands most used by respondents in individual categories:

● Best customer support	Dell
● Most reliable equipment	Dell
● Brand most likely to be purchased again	Dell
● Worst customer support	IBM

Source: APC Service & Reliability Survey 2000

Significantly, 9.7% of respondents said they didn't know what type of processor was in their machine, and it's likely that they don't particularly care. Could it be that the brand of processor is not quite as important to consumers as Intel would have us believe?

When it comes to some of the major brand name PC makers, the results were interesting. Dell topped the list of the five most popular brand name PCs used by APC readers. See 'APC readers rate the brands' (left) for the top five results.

In answer to the question 'Would you buy from that manufacturer again?', Dell also came out on top with 97.7% of their customers answering in the affirmative. Gateway was next with 90.2%, then Hewlett-Packard (80%), Compaq (77.3%) and IBM (61.8%).

Shopping around

Where do APC readers buy their PCs, components and peripherals?

According to our survey, Australians still haven't embraced the Web when it comes to shopping for their PCs: 58.3% of respondents purchased their machine in a computer shop, 6.1% chose the department store option, and 5.1% used a catalogue. Only 7.8% purchased it on the Web.

The attractive thing about purchasing your computer from a shop is that you can touch and feel the merchandise, and hopefully have access to reasonable advice from a knowledgeable salesperson. This provides an important sense of security for many people. However, if you know exactly what you want, you can bypass this option and order through the Net or from a catalogue.

In answer to question 16, which asked which retailer readers used, the most popular response was 'different bits from different manufacturers', followed by direct outlets Dell and Gateway, and retailer Harvey Norman. Many people also purchased from computer specialists and other retailers.

As we've said many times in APC, different methods of purchase have different advantages. A large retail outlet like Harvey Norman may provide a sense of security, but a small specialist dealer can also provide personalised service, along with expert advice. Like most things, the onus is on the purchaser to do at least a little research to establish the best option for their circumstances.

Judging by readers' comments, quite a few people have been stung by small dealers that went out of business and weren't around to provide support for PCs they'd sold. These experiences shouldn't detract from the many other small PC and component retailers that continue to provide loyal customers with valuable advice of sterling service.

Compared with last year's survey, a smaller percentage of respondents nominated best price as the reason they chose a particular manufacturer. This suggests that quality and service may be assuming greater significance for consumers.

Clearly, a computer shop that backs up its products with more than just token after-sales service is assured of repeat business. Most consumers just want a fair go and some good service. They realise that things can and do go wrong with computer equipment, and they value a retail outlet that will deal with breakdowns appropriately.

This may be the reason why the answer 'I had previously bought goods there' featured so highly on the list of reasons why

PCs

Why APC readers chose a particular retailer

It had the best price	27.4%
I had previously bought goods there	18.5%
I saw an advertisement	13.2%
It was recommended by someone	11.5%
It was conveniently located	10.4%
I wanted to buy from a major retailer	5.3%
I searched on the Net	3.8%
Other	9.5%
Not stated	8.3%

Note: readers could choose more than one answer

Where did you purchase the machine?

In a computer shop	58.3%
On the Web	7.8%
In a department store	6.1%
From a catalogue	5.1%
This question does not apply	17.4%
Not stated	5.3%

Would you buy from that retailer again?

Yes	65.8%
No	14.2%
Not sure	15.1%
They are no longer in business	4.8%

people bought from a particular retailer — they'd discovered good service and went back for more.

APC readers' comments: Caveat emptor!

- The worst purchase I made was at a PC recycling shop. I bought a joystick they said was new, which turned out to be faulty. There were no returns, of course. I have since learnt to research properly and buy new components.
- I purchased a cordless Genius Hi Mouse. It stopped working after two months' use. When I tracked down the agent he said he was only interested in selling them and not repairing them.
- I purchased a generic brand PC from a dealer's newspaper ad for a price I thought was excellent. When the

machine started to overheat and I tried to contact the dealer's customer support, I found it had gone into receivership and was no longer in business. My old machine still overheats.

- The worst IT product I ever bought was an entire computer system from an ad on TV. The whole thing was just cheap components put together haphazardly.
- I bought my home clone PC before entering the IT industry — before I knew better. Both the service and quality were bad and of course the dealer isn't around today.

- I purchased a cheap-as-chips desktop PC with cash. When I returned the next day to pick the PC up, I found the store closed and vacant.
- The worst IT product I ever bought was my first computer, an EDGE 486DX66 desktop — poor setup, very poor service, a lack of instructions, and a disappearing dealer.
- When my no-name motherboard started having problems a year after I bought it from a market, I couldn't find anyone to contact for help.

Reliability and support

Ever heard the adage 'you get what you pay for'? Judging by some of the comments submitted by respondents to our survey, many APC readers have been disappointed by products that are not only cheap but nasty.

Particularly annoying for readers is buying a cheap mouse that doesn't work properly. Deep down, you probably know beforehand that a \$15 mouse is too good to be true, but the price tempts you to find out for yourself.

Apart from the el cheapo mouse and some dodgy PCs, the most common sources of frustration among readers were modems, scanners and voice recognition software.

There were complaints from many respondents about both brand name and clone PCs. At the same time, other respondents sang the praises of quality clones and brand name PCs.

Many of you told us you haven't experienced problems, despite buying quite a few items over the years. Some put this down to the benefits of prudent pre-purchase research and listening to recommendations, while others seemed to think they were just lucky. To some extent, these readers may have just been lucky, because many of you also told us about problems with well-known brands — not just cheap, cloned hardware.

When addressing the important question of PC reliability, 80.6% of respondents described their machine as excellent or very good, 13.8% said reliability was satisfactory, while 3.1% said the reliability of the equipment was poor.

In terms of the reliability of the top five brand name PCs used by respondents, 95.5% of Dell PC owners said the reliability of their equipment was either excellent or very good. Of the other four PC brands, 92.7% of respondents with Gateway machines, 70.5% with IBM PCs, 81.9% with Compaq systems, and 80% with Hewlett-Packard computers said the reliability of their machine was either excellent or very good.

Slightly more than 53% of respondents said they had contacted customer support at some time. Most of this support was provided by the retailer (54%) or by the manufacturer (43.9%).



RELIABILITY

Has the equipment ever been unusable?

PCs only

Yes	41.2%
No	58.4%
Don't know	0.4%

Would you buy from that manufacturer again?

PCs

Yes	76.6%
No	10.5%
Not sure	12.8%

Printers

Yes	82.4%
No	5.7%
Not sure	11.9%

Modems

Yes	66.8%
No	12.7%
Not sure	20.5%

Removable storage

Yes	79.1%
No	7.7%
Not sure	13.1%

Source: APC Service & Reliability Survey 2000

SUPPORT

Describe the support received

PCs

Excellent	38%
Very good	25.7%
Satisfactory	24.9%
Poor	11.5%

Printers

Excellent	36.2%
Very good	28.8%
Satisfactory	25.8%
Poor	9.2%

Modems

Excellent	32.1%
Very good	24.1%
Satisfactory	19.8%
Poor	22.8%
Not stated	1.2%

Removable storage

Excellent	28.2%
Very good	16.9%
Satisfactory	35.2%
Poor	19.7%

Source: APC Service & Reliability Survey 2000

APC readers tell all: What is the worst IT product you have ever bought and why?

- Nuts and Bolts for Windows 95 continually crashed my computer and would not work the way it was supposed to.
- My NetComm Roadster II 56 Ultra modem had me spending two days on the phone to technicians trying to get it to work.
- I bought PowerQuest Partition Magic to use with Red Hat 5.2 on APC's original *Linux Pocketbook*. BootMagic trashed the boot sector and I had to do a complete format and reinstall of Windows.
- Two years ago, I purchased a Toshiba Tecra 750DVD notebook. Within six weeks of purchase, coloured lines had formed down the side of the screen. By the end of the two year period, this problem had occurred six times. Each time the screen was replaced overnight, but it usually took them at least two weeks to get the part in.
- IBM ViaVoice software proved to be dyslexic and refused to learn speech. After many hours of training, it was still producing gobbledegook.
- Quantum removable disks aren't being made any more, but Harvey Norman had a fire sale on them. Of course, there was no backup or support available when it broke down within three days.
- My Banksia Wave modem wouldn't work no matter what we did.
- The disks that came with my SyQuest Sparq 1G drive were corrupted, and it took a few months to get replacements. The replacement disks kept becoming corrupted too, and caused the PC to hang/shutdown. The drive is now collecting dust in a cupboard. A waste of money and time.
- My Oocteck DCA2 motherboard was very fast, but extremely unreliable due to its badly fitting RAM modules.
- Within 12 months my Western Digital Caviar 2100 IDE hard disk had bad blocks all over the place. The manufacturer said it was a bad batch.
- The Cirque GlidePoint Touchpad (mouse substitute) cost the earth and was an absolute pain to use. One slip of the finger while in Explorer, and a whole directory would be copied to the wrong address.
- After about six months, my KTX monitor completely stopped working so I sent it back to KTX. Six weeks later I received a new model. After another six months the new monitor played up. I could not be bothered waiting six weeks, so I fixed it myself. Over the next few weeks I fixed it a number of times, but it is now so dark that it is unusable.

When PCs needed repairs, survey respondents exercised a number of options: 35.9% said they repaired the product themselves, 17.4% said the retailer repaired the product, 11.1% said the manufacturer repaired the product, 7.8% said a technician repaired the product, while 3% got help from 'someone I know'.

Overall, 47.1% of respondents who needed repairs to their PCs described the quality of the repairs as excellent, 33.1% said the repairs were very good, 15.8% nominated the repairs as adequate, while 3.8% said the repairs were poor.

We also asked respondents whether they would buy a PC, modem, printer or remov-

able storage device from the same manufacturer again. For modems, an unusually high percentage (20.5%) told us they didn't know, indicating that modems are still a bit of a dark science for many users.

Incidentally, not one major manufacturer of PCs, peripherals or software escaped negative feedback in this survey. ■

life saver!

Microsoft

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PLATFORM



GAAMES

A battle is looming for the hearts, minds and desktops of computer users. Within the next six months, all three of the major desktop operating systems will be overhauled. Will Linux or Mac OS finally break Microsoft's seemingly unshakable hold, or will Windows triumph again? **By Josh Mehlman**

Since Steve Jobs' triumphant return, most of Apple's efforts have been in the hardware department. The iMac and iBook designs have captured the world's imagination, but the OS they run on has been treading water. Some changes have been made, but these are mostly tweaks rather than new features.

Now that Apple has the outside of the box sorted out, it has turned its attention inwards, announcing the impending arrival of Mac OS X. Originally due to be released in September, the release date for OS X has now been put back to the beginning of next year. Who knows what hardware or software gimmicks Apple will come up with in the meantime to keep the faithful happy.

When OS X is finally released, it will be a big change for Apple. The operating system has been redesigned from the kernel up. Its core is Unix based, but with several layers built on top of it, which hide its complexity and make it easier to use than any version of Unix currently available. It will be by far the most visually appealing operating system available, achieving something that seems to be beyond Microsoft: making text look good onscreen.

Microsoft is currently moving Windows in several directions at once, trying to establish a presence in as many segments of the market as possible. Assuming it keeps to its schedules, by the end of the year, Microsoft will have released a new operating system for every segment of the market: Windows 2000 for the corporate environment, Windows Me for home use, and a new version of Windows CE for portable devices.

Microsoft is planning to consolidate all these efforts into a single product, code-named Whistler. Whistler is expected to

supersede both Windows 2000 and Windows Me, but it will be a much smaller upgrade for Windows 2000 users.

Microsoft appears to be saying that Whistler may also be a replacement for Windows CE, but the idea of running an OS the size and complexity of Windows 2000 on a portable device is laughable. Microsoft has been making vague claims about being able to adjust the 'plumbing' of the OS to suit different devices, but it's not clear whether this is a genuine possibility or just marketing hype.

Unlike Apple and Microsoft, Linux is difficult to predict. There tends to be new versions of commercial OSes released every 18 months, so there are discrete jumps in the list of features. These changes are accompanied by enormous publicity campaigns and receive extensive media coverage, where the pros and cons of the new OS's features are debated at great length.

Not so for Linux, for several reasons. First of all, development of Linux takes place on many fronts simultaneously, and usually there are small incremental changes rather than big jumps. The kernel, which is the most important part of the operating system, is undergoing constant development, and patches that add both bug fixes and new features are released periodically.

Unlike other OSes, Linux does not have a standard user interface. Instead, several groups of programmers work on versions of the X Windows system, such as XFree86 and Motif, and several competing desktop interfaces such as KDE and Gnome are also undergoing constant development.

In addition, Linux comprises a great deal more than just the kernel and the UI,

and many features are added on by Linux distributors such as Red Hat and Caldera.

Finally, the Linux community is still a long way from harnessing the media effectively. Finding a list of new features in Mac OS or Windows Me is relatively easy. Finding an authoritative list of new features in the Linux 2.4 kernel is almost impossible. The developer community's attitude seems to be that if you don't already know what the new features are from compiling your own prerelease experimental kernel, then nobody's going to waste their time explaining it to you. There are no spokespeople to deal with media inquiries, and the kernel programmers are not always friendly to the public, or journalists, as APC discovered when researching this feature.

The anticipated boom in Internet appliances has opened up a new battleground for operating system dominance. Windows CE is a popular choice because of its wealth of programming tools and the relative ease with which Windows applications can be ported to it.

However, Microsoft is also rumoured to be developing an even smaller, lighter operating system for mobile phones. This market has also opened up opportunities for OS alternatives, even those that have not become popular in the PC market.

Several versions of Linux are starting to become available for lightweight Internet appliances, most notably Lineo's Embedix Linux (see page 79). A lightweight operating system called BeIA has been developed by Be, and is gaining popularity among Internet appliance manufacturers (see page 81). An upcoming appliance made by Acer will use a version of QNX, one of the more obscure OSes available for PCs.

Microsoft Windows

Microsoft is trying to get its fingers into every piece of the computing pie. All its operating systems are due for new versions in the near future, from Windows CE for portable systems, all the way up to Windows 2000 Server. Despite a great deal of industry talk about non-PC access devices, Bill Gates' keynote address at the Windows Hardware Engineering Conference (WinHEC) in April stressed that Microsoft believes PCs will play the starring role in the future of computing. Gates also said that voice chatting over the Internet is becoming very important, and that voice features will be added to MSN Messenger within the next few months.

Windows CE

Microsoft announced the impending release of version 3.0 of Windows CE for embedded and portable computers at WinHEC. It is expected to be released by the time you read this. The new version has few new features and a lot of version 2.0's features have been enhanced. The display, communications and security features, and real time support for embedded applications have been improved. Microsoft has added support for DirectX and USB devices. It has also included a new browser that is compatible with Internet Explorer 4.

Windows 2000

Microsoft intends to expand the Windows 2000 product line to increase its appeal to larger server environments. Clustering, multiprocessing and addressable memory are the main improvements Microsoft intends to make. Windows Advanced Datacenter Server, due for release about the middle of this year, will support a system of up to 32 processors and address a memory space of up to 64G. It will also allow four systems to be clustered together for high availability with load balancing over a maximum of 32 servers.

Microsoft also intends to have a 64-bit version of Windows 2000 ready for the release of Intel's Itanium 64-bit processor. Aside from its ability to deal with the Itanium processor, 64-bit Windows will have

an almost identical feature set to Windows 2000. It will be able to run 32-bit binaries, that is, programs that have been compiled for the x86 instruction set under Windows 95, 98, 2000 or NT 4.0. However, it will not be able to run 16-bit binaries from Windows 3.1 or NT 3.5. Microsoft expects that its beefiest server applications, such as SQL Server, Exchange Server and the BackOffice range of servers, will be the first to be ported to 64 bits, but has not announced a timetable.

Windows? For me?

Microsoft's successor to Windows 98 SE (second edition) can't help but have an identity crisis. First of all, it was never supposed to exist. Windows 98 was meant to be the last version of Windows

applications. Marketing departments like their consumers in rigidly defined categories, and Microsoft has long been trying to push business customers towards NT and consumers towards Windows 95 or 98. In an attempt to push businesses towards Windows 2000, Microsoft originally planned to eliminate business features from Windows Me and make it a consumer-only product. However, after complaints from both industry analysts and customers, Microsoft capitulated and included some business features.

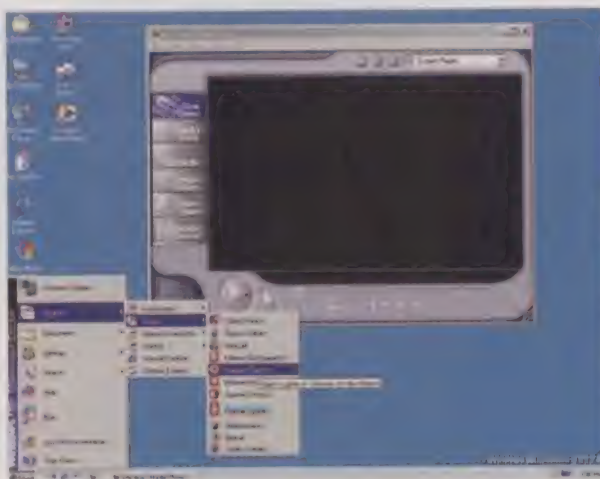
The absence of NetWare and Banyan networking drivers in the Beta 2 version of Windows Me caused particular concern. Although it's possible to install third-party drivers, it's a lot more difficult than just clicking the right box when setting up the PC. Microsoft was accused of attempting to drive customers away from NetWare and Banyan and towards NT networking. Microsoft officials responded that it was simply trying to make the OS easier to install. By the third beta version, NetWare drivers had made their way back into the OS. Support for Active Directory may also be included in the final version.

APC reviewed Beta 2 of Windows Me earlier this year (see APC March, page 36), but Beta 3 contains several changes to the feature set. Despite the hype, most analysts view Windows Me as a minor upgrade from Windows 98

SE; more a collection of patches than a full overhaul.

The most radical change is the removal of the compatibility mode for DOS. You can't load drivers when they start up, or reboot to DOS to run their old applications. DOS applications must be run within Windows. According to Microsoft, this change was made to improve stability and boot times. Most DOS applications still run without problems, but those requiring EMS (expanded memory specification) memory will not work under Beta 2.

Another change is the addition of system file protection, mirroring Windows 2000. If an installation procedure or program overwrites a vital system file, Windows automatically detects this and



Windows Me: Microsoft up to its old tricks.

built on the DOS-based Windows 95 kernel. All subsequent versions of Windows were supposed to be based on the NT kernel, just like Windows 2000. Delays in the release of Windows 2000 mean that Windows 98 SE, and now Windows Me, have the archaic, early-'80s operating system on the inside. Windows Me has also gone through several name changes. It started as Windows Millennium, then became ME (for Millennium Edition). Now Microsoft seems to have settled on just plain Me.

Adding to Windows Me's identity crisis, Microsoft has had an awful time trying to decide if it is an operating system purely for home PCs, or if it also has business

restores the original file. The new program might not work, but at least all the old ones will. Also adding to stability is the system restore function. This keeps track of changes to the program files, system files and registry, made by installing programs or hardware. If something goes wrong, it's possible to wind back the clock to an older, more stable configuration.

Another Windows 2000 feature added to Windows Me is hibernation. The operating system can save the memory state to the hard disk. Instead of fully rebooting, it quickly restores the memory from the hard disk. This saves startup time, but may cause stability problems, especially for an OS that requires frequent rebooting.

Windows Me includes Microsoft's updated CD player, which looks more impressive than the old Windows CD player but doesn't do much that's new. Although you are supposedly able to download track titles over the Internet, this function never seems to work under Windows 2000, and isn't likely to work under Windows Me. Windows Me also allows you to view compressed ZIP files as folders within Windows Explorer. This is a useful addition, but one which third-party add-ons have been able to do with Windows 95 and 98 for years.

Despite a lawsuit and judgement against Microsoft for integrating Internet Explorer with Windows 98, Microsoft is still bundling non-core software with the operating system. If anything, it's getting more brazen. "Nothing was influenced by the legal stuff — I let the legal people do their stuff, and I do mine," Microsoft product manager Art Pettigrew told CNET News.com.

As well as tying you into Internet Explorer, Windows Me pushes you towards Windows Media Player (and its related streaming media formats), MSN Messenger and MSN Web sites. MSN Messenger is integrated with Outlook Express, which can't be uninstalled in Beta 2, but can be removed in Beta 3. Online games hosted on MSN Web sites are presented, along with Minesweeper and Freecell in the Start Menu. Call us cynical, but APC strongly doubts that Microsoft will place icons for games hosted on other Web sites in the same location. Windows Media Player is also given preferred placement, and the new version can act as a jukebox and search for online music sites.

The operating system has improved the management of digital photos. You can download images from a digital camera, edit them and publish them on the

Web without any additional software. Microsoft has written new drivers and compression technologies to improve the handling of digital images and video. As Apple has jumped on the home video editing bandwagon in a big way with iMovie, Microsoft's addition of a digital video editing application called Windows Movie Maker is only to be expected.

Windows Me will contain Universal Plug and Play, which downloads updated hardware drivers over the Net, theoretically improving stability. Windows Me also automatically connects to the Windows Update site and downloads patches and updated system files, rather than waiting for you to do it.

Whistleblowing

Microsoft promises that Windows Me is the last version of Windows to be based on the Windows 95 kernel. The next version, codenamed Whistler, will be based on the NT kernel. Whistler is expected to consist of at least two product lines, one for business and one for consumers. If this is the case, it will be an upgrade for both Windows Me and Windows 2000, but it will be more of a change for Windows Me users than Windows 2000 users.

A Whistler prototype was demonstrated at the recent WinHEC conference and is expected to be released during 2001. At this stage, Microsoft is keeping its plans vague, and seems to be promising a bit of everything to everyone. The most unconvincing promise is that Microsoft will be able to adjust the plumbing of Whistler so that it can run on all sorts of devices, from PCs to PDAs to set-top boxes.

Paul Thurrott's SuperSite for Windows suggests that as well as integrated voice chatting, Whistler may contain a speech-to-text interface, allowing the user to enter voice commands. Microsoft is expected to make changes to the user interface for Whistler, but exactly what form those changes will take is still unclear. They are likely to be variations on the Active Desktop and Digital Dashboard themes, using a customised Web page-style interface that can be adjusted to different preferences. The prototype demonstrated at WinHEC also had a 'save state' function where the operating system could suspend multiple users' sessions when they logged off. This means that when they log on again, they can resume where they had left off.

At WinHEC, Microsoft demonstrated Whistler running on several devices, includ-

Windows at a glance

Latest release: Windows CE 2.0 (for portable PCs)

Next release: Windows CE 3.0

Expected new features: DirectX, USB, new browser, enhanced communications, display drivers and security features

Due: June

Latest release: Windows 98 SE (for consumer PCs)

Next release: Windows Me

Expected new features: System file protection, system restore, hibernation, Universal Plug and Play, better handling of digital photos, video and audio, no DOS compatibility mode

Due: Second half of 2000

Latest release: Windows 2000 (Professional, Server and Advanced Server)

Next release: Windows Datacenter Server

Expected new features: Clustering of up to 32 systems, servers with up to 32 processors, up to 64G of memory

Due: Third quarter of 2000

The future: Whistler

Expected new features: Adjustable 'plumbing' allowing the OS to be run on a wider variety of devices, speech recognition, new interface, improved bootup time

Due: 2001

ing a set-top box and a 'concept PC'. As well as having a monitor, the concept PC had a small LCD and controller, which allowed people to negotiate the basic features of the PC, such as playing the CD, adjusting the volume and launching applications.

A Microsoft spokesperson said that bootup time is one of the major issues the company wants to address with Whistler, and that it is aiming for a system that boots up in less than 10 seconds.

According to Windows user site ActiveWin, two Whistler prototypes have been leaked outside Microsoft and are available for download from the Web. Microsoft confirmed that a very early build was leaked in March, and a second prototype believed to be a later build was leaked in April. The source or motivation for the leaks is still unclear. APC was unable to find these leaked versions online.



Linux

Linux development takes place on many fronts. New versions of the kernel provide new features, but so do new releases of bundled tools such as the X Windows System, KDE and Gnome, and distributors add their own enhancements as well. The latest Linux kernel under development is 2.4. In the Linux world, odd-numbered point releases are development versions, while even numbers are stable, release versions. At the time of writing, the current stable kernel was 2.2.15. The 2.3 kernel is currently under development, and when it reaches a point of required stability, it will become 2.4.

What's new in 2.4

Previous versions of Linux had kludgy and fiddly control over hardware resources such as IRQs and IO ports. This made the installation of peripherals, especially ISA devices, difficult. Even ISA devices with plug and play built in (a system which is meant to automatically allocate these resources), needed to be manually configured under Linux 2.2. Linux 2.4 will include a resource management subsystem which will help automatically allocate these resources for all peripherals. This includes support for ISA plug and play.

Scalability has been souped up to overcome its limitations in **really big servers**. Linux 2.4 removes the 1,024-process limit, allowing the maximum number of processes to be configured at runtime. It can also handle up to 4.2 billion users, 4G of RAM (on Intel hardware), 16 network interfaces and 10 IDE controllers (or 20 IDE drives). Unlike many other OSes, Linux 2.4 will not consume much more memory than its predecessors; under some circumstances it will require less.

The only new processor supported by 2.4 will be Hitachi's SuperH range. Since it can emulate x86, Transmeta's Crusoe processor is expected to run Linux without any difficulties. Support has been added for memory registers in AMD and Cyrix processors. Linux 2.4 will support up to eight-way multiprocessing, but as yet, there is no clustering capability in the OS itself.

Linux's virtual file system layer has been streamlined and the code has been optimised to improve performance in larger systems with many drives. In addition, 2.4 uses a one-paged cache buffer for both reading and writing disk data. This eliminates many of the tricky programming difficulties associated with the need to synchronise separate read and write caches. The file system also adds support for raw I/O devices (devices that bypass



the cache entirely). This is usually for applications such as databases that have their own caching systems.

OS/2 users will be able to write to their disks under Linux, but 2.4 can still only read NTFS drives, not write to them. There is an experimental driver which allows you to write to NTFS drives, but it "may lead to disk corruption under certain situations" according to Linux analyst Joe Pranevitch, so it's probably best to avoid it at this stage. Support for the XFS/EFS file system used by Irix has been added, and for the UFS file system used by NextStep. A late addition was the UDF system used on DVDs. Until quite

recently, Linus Torvalds believed copyright and licensing issues would prevent the inclusion of UDF.

Enterprise users will be happy that Linux 2.4 can mount shared drives on Unix systems which use the NFS protocol version 3. Mac users may not be as happy, since the HFS+ file system used by Mac OS X Server (and Mac OS X when it is released) is still not supported. This is odd, as Apple released the source code for HFS+ as part of the Darwin project (see page 80). Improvements have also been made to the SMB driver which mounts drives onto Windows systems. The kernel can autodetect whether the Windows system is Windows 95, 98 or NT.

Another bonus for enterprise users is the addition of a logical volume manager (LVM), which is a standard feature on many high-end Unixes such as HP-UX. An LVM adds a layer of abstraction over the physical hard disks, which allows several drives or partitions to be combined into logical volumes. This changes spanning physical volumes and resizing partitions from a procedure taking many hours to one that can be done in seconds.

It was initially hoped that 2.4 would include a journaling file system — one that can repair itself if things go awry while the file indexes are being rewritten.

This will not be included on its initial release. However, there are several groups working on this project, and it is expected to be released as a patch to the 2.4 kernel rather than as a feature of the next kernel, according to Pranevitch.

One of the big changes is DevFS, the device file system. Recognising the limitations of the current device naming system, the Linux team has added a more flexible system which provides a lot more information about the devices.

DevFS starts with a blank `/dev/` directory, and adds device names into it as drivers are loaded into the kernel. Devices are then listed under the driver that is used to connect to them. For example, a hard disk drive would no longer be `/dev/hd1` but something like `/dev/ide0/hd1`. Under the old naming system, Linux could recognise no more than 26 drives (HDA through HDZ), but DevFS removes this limitation. It also allows for adding devices such as USB, IEEE 1394 (or FireWire) and PCMCIA.

One area where Linux has seriously lagged behind the competition is in peripheral interfaces. Rather than admitting it dropped the ball on USB, FireWire and PCMCIA, the community tends to downplay their importance with descriptions like this: 'USB, a new external bus type just now coming into prominence'. The good news is that support for all three of these buses will be included in 2.4. The range of USB devices that work with 2.4 is mostly limited to the keyboard and mouse. Support for I2O communications devices will also be included.

An important addition is the Direct Rendering Manager (DRM) which adds an abstraction layer over the graphics hardware, allowing programs to make calls directly to the hardware, regardless of the type of video card used. It is similar in many respects to the DirectX drivers in Windows. The DRM can bypass X Windows, which has difficulties and limitations, especially when it comes to games.

The Linux networking layer has been completely rewritten for 2.4, which should make it more stable and efficient. Support has been added for DECnet and ARCnet protocols, allowing it to communicate with older Digital and Compaq systems. Support for ATM network adapters has been added. The PPP code has been redesigned, combining the ISDN and serial layers, and adding support for

PLIP (PPP over parallel ports) and PPPoE (PPP over Ethernet), which is used by DSL modems.

The new 2.4 Linux kernel will have an internal Web daemon, khttpd, which will be able to process HTTP requests only. Anything more complicated, such as CGI, will be passed through to a Web server package such as Apache. This should make Linux very efficient at serving static Web content.

What else is new?

Microsoft will have a 64-bit version of Windows 2000 ready in time for the release of Intel's Itanium processor. There will also be a version of Linux ready to go when the Itanium is released, thanks to the IA-64 Linux project, formerly known as the Trillian project. This group started in May 1999 and its members are a who's who of the Unix and Linux communities, including Caldera, CERN, Hewlett-Packard, IBM, Intel, Red Hat (through its subsidiary Cygnus), SGI SuSE, TurboLinux, and VA Linux Systems.

The group completed a working IA-64 Linux kernel in February this year, and released the source code to the developer community. Work is still under way to allow for symmetric multiprocessing, IA-32 support, threading and performance monitoring. Many of the other compo-

Linux changes

Latest release: Linux kernel 2.2.15, (numerous distributions)

Next release: Linux kernel 2.4

Expected new features: greater scalability, logical volume management, support for USB, FireWire and PCMCIA, improvements to file system and networking

Due: 2000

nents of the Linux distribution also need to be recompiled or reoptimised for IA-64. Some of these have already been done, such as Apache, Sendmail, X Windows (XFree86) and Gimp. Others still need work, for example, KDE, Gnome, Enlightenment and Samba. Like its Windows counterpart, IA-64 Linux will be able to run IA-32 (x86) instructions without any difficulties. IA-64 Linux is by no means the first 64-bit version, as Linux has already been ported to 64-bit platforms such as SPARC.

Linux is also getting into smaller systems. Lineo, a subsidiary of Caldera, distributes a version called Embedix Linux, which is optimised for small, embedded applications, from routers and modems to PDAs and mobile phones.

Since April, Lineo has gone on a spending spree, acquiring companies such as Zentropix, Rt-Control, USE, Moreton Bay Ventures, FirePlug Computers and INUP, acquiring their combined knowledge and expertise in the field of Linux and embedded applications as well. Every part of Embedix Linux has been shrunk to its minimum requirements; for example its Glibc has been reduced from 1,200K to 600K. The kernel also features modules which can be loaded and unloaded as needed.

Although the next kernel after 2.4 is commonly referred to as Linux 3.0, kernel developer Alan Cox said the version number still hasn't been decided. Plans for new features in the next kernel are equally vague. A journaling filesystem will definitely be included if it hasn't appeared as an update of 2.4. Support for clustering will probably be included, as will support for NUMA (non-uniform memory access), which allows several processors in a multiprocessor system to share the same cache memory. IBM recently announced its intention to assist in the development of a Linux version for its 64-processor NUMA-Q server.

Monterey

It seems that commercial versions of Unix are expected to retire and die quietly in a corner, beset as they are by a burgeoning Windows NT and those pesky Linux people giving it away free. Faced with the prospect of having to rewrite their operating systems for the 64-bit Itanium processor, several Unix distributors decided this was a good time to exit. SGI switched from Irix to Linux, while Compaq gave up on Tru64 Unix for IA-64. Not everyone has given up; Sun will port Solaris to IA-64 and Hewlett-Packard say HP-UX can already support IA-64.

Three of the largest remaining Unix distributors have chosen to pool resources on a project called Monterey. This will combine IBM's AIX, Sequent's Dynix and SCO's UnixWare into a single version of Unix that will run on Itanium and IBM's PowerPC chips. IBM also acquired Sequent midway through last year.

An alpha version of Monterey was released to developers in March this year. Like Windows 2000 and Linux, the Monterey development team expects that it will be ready in time for the launch of Itanium later this year.

Monterey has attracted support from software developers. Computer Associates, Netscape, PeopleSoft, Baan, and Tivoli are among the businesses that have announced that they will develop Monterey versions of their products.

Interoperability with Linux will be provided by a Linux Application Execution environment, which will allow many Linux binaries to run under Monterey. IBM is also providing support for the effort to port Linux to IA-64. Clearly, IBM sees Linux as a lower-end operating system, and expects Monterey to be a step upwards. Providing Linux compatibility leaves people with an easier upgrade path to bigger, better and ultimately more expensive things.

Mac OS

Those of you with long memories might remember Rhapsody: an attempt to revamp Mac OS which Steve Jobs started soon after his return to Apple in 1997. Those with even longer memories might recall NextStep, the operating system produced by NeXT, the company Steve Jobs started when he was booted out of Apple in 1985. In billing OS X as "the next generation in the evolution of modern operating systems", Apple conveniently ignores how much OS X owes to these two extinct OSes, and to an even older operating system: Unix.

Mac OS X is built in four layers: the core OS is called Darwin; it has three graphics engines (Quartz, OpenGL and QuickTime); three APIs (application programming interfaces) known as Classic, Carbon and Cocoa; and a GUI (graphical user interface) called Aqua.

The Darwin core is based on the Mach 3.0 kernel developed by Carnegie Mellon University, and the FreeBSD 3.2 operating system. Apple has released parts of Darwin to the developer community as open source, in a way that appeals more to the open source movement than to the Free Software Foundation. Apple is hoping the developer community will help stamp out bugs and even develop new features for the OS. Darwin features protected memory, pre-emptive multitasking and uses the BSD TCP/IP stack for networking.

Apple is losing ground to Windows because of its poor 3D graphics (read 'games') support, so OS X includes an OpenGL 3D graphics engine. It uses Apple's own QuickTime standard for video. To improve the appearance of text onscreen, Apple has built Adobe's PDF into the operating system for rendering, anti-aliasing and compositing 2D images onscreen. This allows a greater amount of control over the way the OS looks. Buttons are translucent, windows have drop shadows and text is crystal clear and very readable. Any OS X application will be able to save documents as PDF files.

Apple realises the value of backward compatibility, which is why it includes the Classic API, which will allow almost all applications that run under OS 9 to run under OS X. The disadvantages of Classic are that applications will look like OS 9 applications, and will not be able to take advantage of the OS's protected memory. OS X dedicates a section of memory to all the applications running under Classic, so if one crashes, chances are the others will too. Apple admits there will be some applications that have to be rewritten because they will not work under Classic, but those that access the hardware directly or delve very deeply into the operating system will be the ones most affected.



A new look for Mac OS.

The Carbon API is the standard OS X interface. Applications written under Carbon will use OS X's Aqua user interface, and will be able to take full advantage of its protected memory and multitasking. Apple claims that applications written for OS 9 would take very little reprogramming to work under OS X's Carbon API.

Cocoa is an object-oriented API, which Apple claims will make programming much easier and faster. Apple interim CEO Steve Jobs said at the most recent Macworld exhibition that applications can be thrown together in a matter of minutes with Cocoa.

The split between Classic and Carbon is a concept borrowed from Rhapsody's Yellow Box and Blue Box, and Cocoa's

object-oriented programming is borrowed from WebObjects, a product developed by NeXT.

Pretty interface

If Apple's claim to have designed this new OS from scratch is suspicious, its claim to have started with a blank screen when redesigning the user interface is even more so. Have you ever noticed how computer operating systems in sci-fi movies look like they were put together by a team of graphic artists on an SGI graphics workstation? Aqua is so full of whiz-bang gimmicks and little bits of visual fluff that it's very close to 'movie OS'. The Aqua user interface looks

wonderful, no question about that. The buttons and scroll bars look like they're made of transparent gel, and the drop-shadowed windows, animated sliding windows and clear, readable text are all very impressive.

As well as visual chicanery, there are genuine innovations, mostly related to reducing screen clutter. When you open up new panels or dialogs to print or save documents, for example, these remain attached to and floating above the window to which they belong, and even if you switch applications, they will remain attached to their respective windows. In addition, single window mode keeps one window open at any time. When switching applications, the unused application automatically minimises itself as the new one pops up.

The remaining 'innovations' are not as innovative as Apple would have us believe. For example, there's the Dock: an area at the bottom of the screen where all your active documents and applications can be stored. Sound familiar? Why yes, Windows has had one since Windows 95, and so have many Unix desktop environments, only they're called taskbars. The Dock is better animated, but conceptually it's very similar. The revamped Finder's cascading menus for file navigation are yet another NextStep/Rhapsody reference, and programmable buttons such as 'Home' and 'Documents' merely bring Mac OS up to speed with Windows.

A persistent rumour that circulates throughout Mac fan sites is that Apple will port Mac OS X to run on Intel processors, possibly x86 architecture or more likely IA-64. It would be relatively easy to port the kernel to any platform desired — at least part of the Darwin source code is freely available — but getting Mac OS to run on the heterogenous Intel hardware environment would be no mean feat. Although there are many who think it extremely cool to run Mac OS on their Intel hardware, there is more than just wishful thinking behind these rumours.

Mac OS on Intel?

Mac's dependence on the Apple-Motorola-IBM alliance that created PowerPC could be its undoing. IBM and Motorola have announced that they will no longer be developing the PowerPC as a high-performance desktop processor, and will instead be focusing on embedded applications. Once the G4 becomes obsolete, Apple will need to find a way of continuing to make Apple computers with a new, high-performance multimedia-capable processor.

Either Intel or AMD could supply processors in the volume Apple would demand. However, Intel's recent manufacturing shortfalls would not inspire confidence.

There are few other processor architectures remaining that are produced in sufficient volume and that Apple would be able to license. After all, Apple's strategy of late has focused much more on the externals of the system than what's inside it.

While Apple would probably not actively promote putting 'Intel inside' its system, it might be possible to run Windows on Mac hardware if it used an Intel processor. Apple is clearly not threatened by the possibility of running Linux on its hardware — Apple developed its own version, after all — but Windows is another matter.

If it were made possible, Apple might gain some new converts running Mac OS on Intel hardware, but it would also lose some customers who buy Apple hardware and run Windows on it for compatibility with existing systems or applications. If Apple was forced to sell its hardware on its own merits it would be competing against a vast range of PC manufacturers, with nothing but exterior styling to differentiate it from the rest.

Mindful of its established hold on the publishing and education markets, Apple is emphasising the multiple language capabilities of the new OS. Rather than producing separate foreign language versions, each installation CD will ship with all languages available at the time. A hierarchy of

Mac OS at a glance

Latest release: Mac OS 9

Next release: Mac OS X

Due: January 2001

Expected new features: Unix-like kernel architecture with protected memory and pre-emptive multitasking, redesigned user interface, new 2D graphics engine for more readable text and images

The future: May run on Intel hardware, open source community may develop new features

preferred languages, say English, Spanish then German, can be selected, and each application knows which languages it can use and will default to the one highest up on your list of preferences. Apple officials estimate OS X will initially ship with eight languages, and Japanese is a definite inclusion, but Chinese is less likely.

Until recently, Apple maintained that OS X would be released in September this year. At a recent Apple conference, Jobs announced that the release will be delayed until the beginning of next year, but beta versions should be available in September.



Be yourself

Be is taking a big risk.

Founded in 1990 by former Apple honcho Jean-Louis Gassée, Be started out with the aim of delivering an efficient, lean, legacy-free operating system; one which didn't have to support decades-old software features. There's no question it delivered. Not only is BeOS efficient, small and fast, but it remains the only operating system where upgrades take up less system resources, particularly memory, than previous versions. Although Be found a significant niche in multimedia applications, it has never made it to the mainstream.

Recognising fundamental shifts in the marketplace (mostly as a result of Linux), Be decided to make BeOS 5 available free. In addition, much of the source code has been released as open source. Be has also released BeIA, an operating system for information appliances. Will these strategies pay off?

The biggest change in the free version, BeOS 5 Personal Edition, is that it only runs on Intel and no longer requires a



separate disk partition. Personal Edition resides in a folder on any FAT partition, and its virtual file system works within a single disk image file on the hard disk. The file can be moved or copied within Windows. For hardened Be fanatics, Be has also released BeOS 5 Pro Edition, which runs on both Intel and PowerPC platforms.

Bill Gates might think that PCs are the future of computing, but Be is banking on information appliances becoming a lot more popular. BeIA is a lightweight operating system designed to be installed in portable Internet access devices and consumer electronics. The entire operating system, including the Opera browser and RealPlayer, takes up less than 8M of storage space. It has already been adopted by manufacturers such as Compaq, National Semiconductor, Qubit and FIC.



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Motherboard Feature Comparison Table

	Chipset	APU	PCIe/SSD/HB	DDR4/DDR5	RAM/Storage	Performance	Reliability
A-Trend ATC3200-V	APU A	2s	5.2s	4.5s	3.8s	Medium	Good
Hypon AI004 Pro	APU B	1s	6.1s	4.2s	3.5s	Average	Excellent
Apex P100-X	APU C	4s	6.0s	4.3s	3.9s	Excellent	Excellent
Apex P1000-X2	APU A	2s	4.1s	3.8s	3.2s	Medium	Excellent
Chomtech NAT-A4	APU X	4s	5.1s	3.5s	2.9s	Average	Medium
Dyn-X300	APU X	4s	5.1s	3.8s	4.1s	Good	Excellent
Gamma VPI	APU A	2s	6.2s	3.8s	2.9s	-	Unknown
HL-K-A11	APU X	4s	5.2s	4.5s	3.5s	Good	Poor
Hyperion Hyper-X-1	APU A	2s	5.2s	4.2s	4.1s	Good	Good
Intel N101	APU A	2s	5.1s	3.5s	2.8s	Medium	Good
Kingdom Ark4411	APU X	4s	6.1s	3.8s	3.2s	Medium	Good
Legend Legend-X1	APU X	2s	4.1s	3.5s	3.1s	Medium	Good
Long V8000-001	APU X	4s	5.2s	3.5s	2.8s	Medium	Excellent
Neo Nova-X	APU A	2s	6.2s	3.8s	2.8s	Good	Good
Neo Nova-X-PRO-A	APU X	4s	6.2s	3.8s	2.8s	Good	Poor
Phoenix V101	APU X	4s	5.2s	3.8s	3.8s	Good	Excellent
Robot 8000-X	APU X	4s	5.2s	3.8s	3.8s	Excellent	Excellent
Sagecraft ProX-A1	APU X	4s	5.2s	3.5s	2.9s	Good	Poor
Star THX-G4	APU X	4s	5.1s	3.5s	4.5s	Good	Excellent
Unimicro TW-0010	APU X	2s	6.2s	3.8s	3.8s	Average	Excellent
Tyco N1004	APU X	4s	6.1s	3.5s	2.8s	Average	Excellent

Source : <http://www.tomshardware.com/mainboard/00q2/000410/index.html>

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Six months after the government introduced its controversial online censorship act, the ABA has not made even a minor dent in the availability of illegal material on the Internet. Its detractors are calling it a waste of taxpayers' money and a disincentive to online businesses, but the ABA claims it's working well. Will the act ever pick up steam? **Andrew Colley** investigates.

The introduction of the Broadcasting Services Amendment (Online Services) Bill 1999 — the Federal Government's attempt to regulate Internet content in cooperation with the Internet industry — will be remembered as one of the more bizarre episodes in Australian politics. The story of the bill's passage to law is like an episode of *Yes Minister*. The bill was presented to the Australian public as an opportunity for morality to prevail, but it was almost universally criticised for being unworkable. In fact, it was only accepted by its most vigorous opponents in the Internet industry after it was rewritten to ensure it would have little effect on them.

The ultimate aim of the Online Services Act is to regulate Internet content, and the

government set out many goals to this end. In a press statement issued in conjunction with the Attorney-General Daryl Williams in July 1997, Senator Richard Alston outlined the broad principle behind the legislation. "As a guideline, what is protected behaviour 'offline' should be protected behaviour online," he said. This was widely understood to mean that the legislation aimed to re-create for cyberspace the censorship scheme that applies to established forms of media such as print, film and television.

The regulation scheme works on a complaints-based system. Rather than actively tracking down sites that the legislation deems objectionable, the ABA (Australian Broadcasting Authority) has a group of investigators dedicated to field-

ing complaints about Web sites. Complaints are investigated, and if a site hosted in Australia is found to violate the law, the ABA issues a notice for its closure.

The Online Broadcasting Act requires Internet material to be rated in the same way that the Office of Film and Literature Classification (OFLC) rates films. According to the terms of the Broadcasting Act, if the OFLC were to grant a site an R classification, it would be required to sit behind an adult password verification system.

The OFLC guidelines for film are generally more stringent than those for print and deal with a much broader range of topics. In addition to criteria for evaluating material of a sexual nature, the R category deals with the more ambiguous

areas of adult themes, coarse language, drug use and youth suicide.

ABS surveys of Internet use found that 5.5 million adult Australians (40.2%) accessed the Internet in the 12 months to May 1999. However, the ABA's complaints body only received 124 complaints during the first three months of operation. Following the investigation of these complaints, the ABA issued just 31 final take-down notices against Web sites hosted in Australia. In at least three of these cases, the same material was made accessible from offshore servers in a matter of hours. In addition, 45 items were reported to software filtering companies and another seven to law enforcement agencies. At the time of writing, another 23 investigations were under way.

Gilbert & Tobin solicitor Brendan Scott believes the legislation has been a failure. "Given the government's publicity before the legislation was released, the ABA's performance is not heartening. Harking back to the government's releases of April to June last year, you'd be forgiven for thinking that the Internet in Australia was nothing but a seething morass of prohibited content. It's reasonable to assume that a morass less 31 items is still a morass," he said.

However, Steve Nugent, ABA manager of online content regulation, believes that the ABA has achieved its goals so far. "I think it [the legislation] is working well given the constraints that we're working under and the nature of the medium," he said. The goals he describes are chiefly the administrative tasks involved in setting up the scheme.

No-one is denying that the number of sites taken down is small, but Internet Industry Association (IIA) executive chairperson Peter Coroneos fits the figures into a larger, more positive picture of the legislation. He said that the small number of sites taken down demonstrates that fears held by civil libertarian and anticensorship groups that the legislation would be overly punitive are unwarranted.

As the aim of the legislation is to provide Internet users with a measure of protection from offensive material, according to Coroneos, "it would be wrong to say that the continued existence of porn on the Net is evidence that the legislation has failed. Neither the government nor the industry ever believed that it was possible to stop this. The key has been to offer solutions where they may not have existed or been known about before." These "solutions" primarily consist of the Internet filtering software that ISPs are required to make available to Internet content super-

Challenges for ISPs

In spite of the IIA provisions, there are some difficult legal questions tugging at the coat tails of the amended Online Services Act.

Brendan Scott, a solicitor with Gilbert & Tobin who specialises in Internet law, has closely followed the development of the legislation. Although it has been progressively revised to protect ISPs from excessive legal and financial burden, he is still concerned about the welfare of ISPs under the provisions of the act.

For Scott, the devil is in the detail. "The act has been written in a very convoluted fashion, so it's hard to understand its intricacies unless you have some solid legal training," he said. His main concern is the practical implications of the act for ISPs complying with ABA (Australian Broadcasting Authority) take-down notices issued against content hosted within Australia.

The act requires them to respond to notices within one business day from the time a notice is "given", or face fines of up to \$27,500 per day. The difficulty centres on the word 'given'. He argues that this places an unfair burden on ISPs to have measures in place that allow them to immediately know about, and react to, notices. Mail does not always get from the sorting room to its addressee on the day it arrives.

Scott's second concern is equally serious. Once the ABA has issued a final take-down notice, further provisions in the act direct the ISP to "not host" that content in the future "whether or not any further notice is issued in relation to that content". As there is no time limit on that obligation, after receiving a take-down notice an ISP would have to monitor content entering its servers. Government and industry both locally and globally are anxiously trying to avoid placing this kind of burden on ISPs. "Whatever you think about censorship, a regime that makes carriers the ones shouldering the responsibility is fundamentally flawed," he said, "It's sort of like making Australia Post responsible for letter bombs."

Although the laws are unlikely to be applied, Scott is concerned about the serious faults in the legislation. It's possible that a number of ISPs and Web hosting services are, with or without their knowledge, hosting prohibited content. As a result, it is reasonable to assume that the laws could be used to target particular ISPs.

visors (parents, teachers and so on) under the IIA codes.

ISPs cooperate

The IIA developed three codes of practice that were registered by the ABA to work in conjunction with the government's Online Services Act. The codes are seen as an 'umbrella' to protect ISPs. The terms set out in early drafts of the Online Services Bill were extremely onerous for ISPs. General Internet access, prohibited content hosted within Australia and prohibited content hosted offshore were all held to be the responsibility of ISPs. This last category caused ISPs the greatest concern.

Had the original bill been passed, ISPs would have been required to install server-side filters to block offensive content originating from overseas. Both the government and industry agreed this requirement would create more problems than it could ever hope to solve. Under the revised legislation, ISPs are responsible for providing their customers with information about Internet filtering software, or as it is more commonly called, 'censorware'. Consistent with its history of pro-

moting self-regulation, the IIA had been working on an industry code of practice for about three years when the legislation was first tabled in the Senate. "The effect of the legislation was really just to broaden and accelerate industry-led initiatives," according to Coroneos.

Although the representatives of ISPs that APC spoke to were not willing to provide details, it appears they have found it easy to comply with the three codes. Arguably, the most difficult requirement of the codes is that ISPs must provide their customers with information about an approved software filter.

Many ISPs have entered into commercial arrangements with software manufacturers to ease the financial burden for customers who wish to purchase the software, but purchase and use of the software is entirely voluntary. It seems that as long as an ISP adds a few extra pages to its home page to educate its users about the new legislation and the IIA codes, and points them in the direction of an approved Internet software filter, the ABA is satisfied.

ISPs would be foolish to rock the boat, and they have been largely silent regarding the legislation. APC asked a number of

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ISPs what apparatuses they have in place to comply with the industry code and sought their comments on the new legislation. Generally, only the larger ISPs seemed to have made any substantial progress in introducing compliance schemes.

ISPs were cautious about commenting on the legislation. Although some representatives told APC they are glad that families can now seek some sort of protection from the evils of the Net, off the record others said that the legislation was completely useless.

Side effects

Civil libertarian groups have been left wondering why the government dipped its hand into the public purse to pursue legislation that was widely viewed as problematic and even futile.

Danny Yee is a board member of the Electronic Frontiers Association (EFA), a national organisation formed to protect and promote the civil liberties of users and operators of computer-based communications systems. He feels that from a technical point of view it has always been apparent that the legislation is completely unworkable and that pinning its success on filtering software is laughable.

An enormous number of sites are already in software filters' block lists, but millions more have not been evaluated. Yee is skeptical about the value of the ABA's addition of another 45 sites to block lists. He said, "its original goals, as stated by Alston and apparent in the legislation, have clearly been abandoned — and were clearly unfeasible and unworkable anyway. What's left appears to have no sensible goal at all."

Fellow civil libertarian, EFA chairperson Kimberley Heitman describes the censorship legislation as a token effort rather than a serious attempt to regulate the Internet. This is reflected in the number of strikes on the ABA scorecard. For Heitman, the real victim is civil liberties. "There has been a chilling of free speech generally, because people have become too nervous to host controversial content. Some ISPs have already starting telling users and content providers that they can't post controversial content," he said.

Heitman fears that Internet users will be dissuaded from visiting sites that aren't sexually offensive but deal with adult themes. "Pre-registration of passwords in other forms of media has led to a dramatic reduction in the number of people willing

to investigate such material," he said. Net surfers may feel hesitant to verify their age and identity when visiting certain sites, for instance a site concerned with sexually transmitted diseases.

One site affected by the new laws is Pinkboard (<http://www.pinkboard.com.au/>), a Web-based gay and lesbian bulletin board service. Over time the site has become an invaluable information resource for the gay community. Because it has been classified R, its owners must now insist that visitors use adult verification systems to enter.

"There has been a chilling of free speech generally, because people have become too nervous to host controversial content."

Trusting the ABA

Not all content providers are satisfied by the ABA's reassurances that it will carry out its regulatory responsibilities with appropriate sensitivity. Heitman told APC that several non-pornographic sites have moved offshore for fear of facing regulatory pressure in Australia. "I do know of several sites — such as a search engine, a classified ads site and a women's health site — that have felt the need to move offshore," he said. "These are precisely the sorts of sites that the EFA identified in its submissions as collateral damage."

It's difficult to assess this effect of the legislation because the ABA is not willing to release detailed information about Internet content that it has assessed. The ABA's press releases only contain generic information, such as their OFLC classification. Although the OFLC usually lists details of its assessments on its online database, APC could not find any record of the ABA's investigations.

Aside from the issue of the public's right to monitor government activities, this lack of openness in the complaints process makes it difficult for content hosts and providers to make assessments about

what content they should and shouldn't place online. A spokesperson for the ABA told APC that it was discussing this issue with the OFLC, but that for the time being its prime concern is preserving the privacy of complainants and content hosts. Yee is not convinced. "If the censored sites were public knowledge, then the ABA (and the OFLC) would cop flak for any inconsistent decisions they made. As it is they could screw up totally and no-one would know," he said.

Yee has earned a reputation as the ABA's number one critic. He has tried to test the legislation by strategically placing material on his own sites and then calling it in to the ABA's complaints service. Such material included Marquis de Sade's *Philosophy in the Bedroom* (in French) and raunchy passages from Linda Jaivin's novel *Eat Me*. These books are available in Australian bookshops and libraries, but any reasonable reading of the OFLC guidelines for film should prompt an R rating (at least) for both. However, when they were submitted to the ABA, neither qualified for an R rating.

"The ABA is probably going to use its discretion and turn a blind eye to anything where censorship would get them into hot water. I can't see any way that, under the actual OFLC guidelines, de Sade wouldn't get at least an R rating, but the last thing they want is a headline like 'de Sade re-banned after 30 years'," Yee said.

The veil of secrecy surrounding the ABA's online regulatory operations hasn't concealed the impact that the legislation is having on the online adult services industry. Cases where Australian pornographic sites have been issued with take-down notices have been well publicised in both local and international media. The case of porn site www.teenager.com.au illustrates the futility of trying to regulate the Internet within a geographically defined jurisdiction.

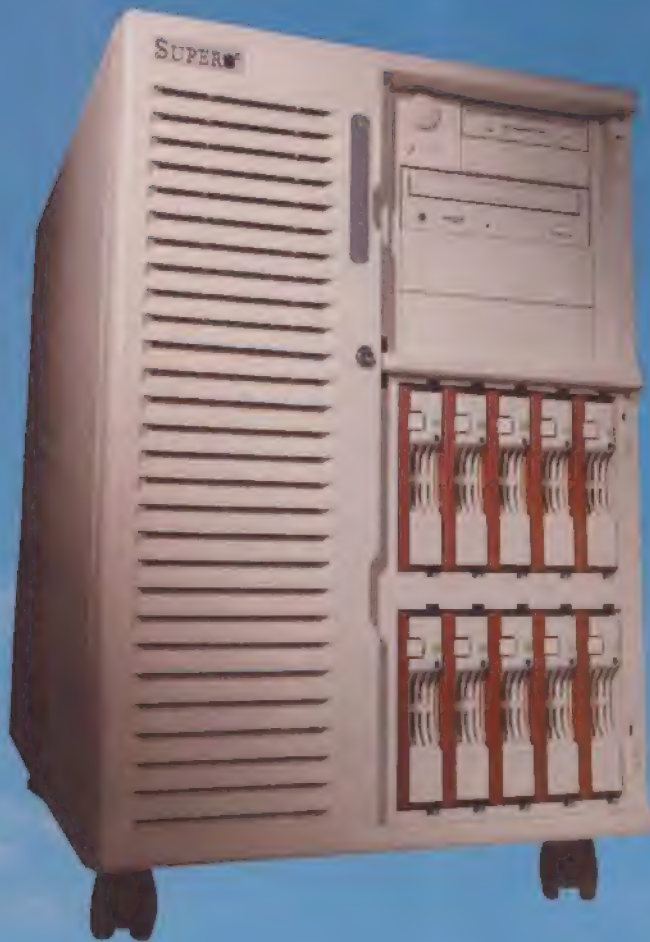
Within 18 hours of having a take-down notice issued against it, the site was accessible at the same address on an offshore Web hosting service, safely out of the broadcasting legislation's reach. A spokesperson for Telechat, the owners of www.teenager.com.au, said "Joe Bloggs wouldn't know whether a com.au site was being hosted here or Mars."

The impact on the industry

The Eros Foundation represents the interests of the Australian adult services industry. Eros Foundation campaign

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manager Robbie Swan thinks that the legislation is seriously flawed and that pushing adult sites offshore is actually counterproductive from the point of view of responsible content regulation.

"They're all using American or Paraguayan or Upper Voltan servers to host their content, and as a result, they're out of reach of the legislation. But they're also out of reach of their own industry associations," Swan said. He feels that this has removed any hope of regulating Internet content.

"[Senator Alston] hasn't stopped them posting explicit material on the Internet, but he's stopped Eros from having an effect on what kind of material goes up," he said. The Eros Foundation had been developing a code of practice before the legislation was proposed. In response to the legislation, it accelerated the process of completing its code, bringing it into line with the IIA's.

The Eros Foundation also believes that the legislation has fallen well short of its goal of replicating offline censorship in cyberspace. It argues that Senator Alston and supporters of the legislation in the government disingenuously represented the legal status of X-rated material to the media to bolster support. "[Senator Alston's] rationale for eliminating X-rated material from Australian ISPs was

that X-rated material is banned. That was just total garbage because it clearly isn't. Over a million adults buy it from the ACT every year" Swan said.

The Eros Foundation may challenge the legislation in the High Court in the future, basing its case on a section of the

ventional delivery systems. Under the new legislation it doesn't.

The costs

The low number of complaints received has allowed the complaints scheme to work within its budget. The scheme was allocated \$1.26 million for its first year of operation. It has only managed to remove 31 sites in its first three months, and the majority of these sites were rated RC, which means they contained content that was already illegal under pre-existing laws.

At the same time, it's clear that while ISPs won't suffer greatly in their capacity as content carriers, as Web hosts they may face considerable losses as sites move offshore to avoid regulatory pressure. Web content providers could be seriously affected, although relatively few have moved offshore yet.

Presumably, the ABA wouldn't want to set a precedent of banning sites that host controversial content, but the legislation could be a time bomb. Think back to the controversy created when it was proposed that condom vending machines be placed in high schools. How long will it be before someone gives the ABA a call about a sexual health site aimed at young people, for example, and sparks a major test case? ■



constitution that ensures freedom of trade between the states. It allows material to be sold from one state to another, even if that material is illegal in the recipient state. These laws currently protect the sale of X-rated material from Australia's territories to the states. The Eros foundation argues that the Internet should have the same legal status as con-

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ONLINE OFFICE SUITES



The development of free Web-based applications for word processing and file storage is threatening Microsoft Office. **Fiona Williams** looks at the advantages and disadvantages of online office suites.

It was only a matter of time before the Internet became an integral part of the office suite. No longer used merely for drafting letters, presentations or for keeping your résumé up to date, today's office programs can handle online documents and create professional Web pages. The next logical step is for the applications themselves to become Net-based.

Rather than have a monster office suite like Microsoft Office 2000 eating up precious hard drive space, why not simply access a Web-based program for all your word processing and spreadsheet needs? What's more, by storing your files and documents on the Web server, you can save hard drive space for a rainy day (or for your favourite downloads, as the case may be). Considering that Windows 2000 requires a minimum of 650M of free hard disk space to run, a Web-based office suite can make a big difference.

The trend towards application service provision (ASP) means online applications are now being touted as the next big thing on the Internet. The big software developers are scrambling to get a piece of the action. Microsoft has a vested interest in the office suite business, so it stands to lose the most if people take to online applications with gusto. As a result, it's developing Microsoft Office Online, which will be available from the company's bCentral small business portal and also for lease from third-party ASPs.

Sun's popular StarOffice, an office suite currently available as a free download (and also available on the APC May cover CD) will soon make a permanent move to the Web. StarOffice 5.1 is the centrepiece of StarPortal, a fully fledged online office suite to be released later this year.

In Australia, Lotus has been testing its software applications for Telstra Big Pond Direct and Big Pond Intranet services. Lotus' intention is to build a full-scale ASP business later this year, to allow smaller businesses to access Lotus software applications using a standard Web browser.

However, while the big names are still testing and developing their online office suites, four relatively small players already have online office suites available — and they're all free.

How do they work?

Online office suites work in much the same way as conventionally installed programs. Most have a similar array of word processing, spreadsheet and presentation programs, and some throw in added extras like an email account, calendar and address book for good measure. A Web server takes care of the storage of files and documents, which enables you to retrieve your documents at any time, from any Internet connection. To start using a program, you simply set up a password-

protected account, download a couple of small core applications and get to work.

What's the attraction?

The most useful feature of online office suites is that you can access your data from any Internet-ready PC or device. You can use your home PC or notebook to retrieve the files you worked on at the office.

What's the catch?

Obviously, you need Internet access to run the programs. This is not always possible, particularly for travellers, but many of the programs convert files to plain text, so you can use a conventional word processing program to keep working on them offline. Another reason these suites may not take off is security. Many businesses would be uncomfortable storing sensitive documents on an external server, despite the servers' promises of the latest security technologies — which translates into password protection and file encryption. Some people may prefer to save documents locally, but it limits you to one location.

The online office suites APC reviewed below have a lot of useful features and are all free. This means you can try without buying, which might not be the case once the big software companies muscle in on the market.

FreeDesk

Consisting of Java-based applets such as a word processor, spreadsheet, graphics program, HTML-authoring tool, email account and storage facilities of up to 50M, FreeDesk has all the standard features you would expect in an online office suite. The applications allow you to work with files in various formats such as Microsoft Word and Corel WordPerfect.

There is advertising, but it plays a minor part. The ads are barely noticeable because they are present only on the login screen and disappear once you commence work in the office suite.

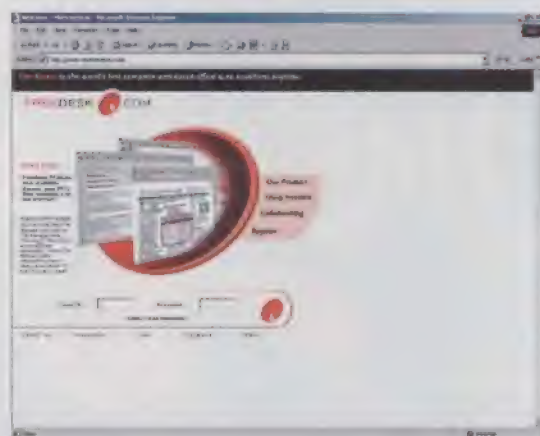
The most obvious benefit of an online office suite is that you can access files irrespective of your location. The manufacturers of FreeDesk have come up with a handy feature called PCShare, which allows you to access your main PC's files from a remote location.

By downloading an 800K program called PCShare on your main PC, and specifying which folders you would like to share, you are automatically permitted to access these files when logging on from another PC or Internet-accessible device. This feature can be extended to allow

other specified FreeDesk users to access the same files. This is handy for collaborating on a project that requires access to mutual files. Rather than emailing files back and forth, you can access specific folders and directories on other PCs. This feature can be removed if you don't fancy the thought of strangers having access to your hard drive.

There is one thing that is particularly annoying about FreeDesk. It is pain-stakingly slow to follow through on simple commands. It takes several seconds to register keystrokes. As you can imagine, it requires a lot of patience to complete a document. The sluggishness of this program was in marked contrast to ThinkFree Office, which processed commands instantly.

FreeDesk officials said it is redesigning the Web site and planning to incorporate a more Windows-friendly look into the applications. As they stand, the applications are usable, and there are comprehensive help functions and tutorials.



FreeDesk has some interesting features, but it has basic problems that need to be fixed before it becomes a worthy alternative to conventional hard drive-based applications.

Contact	FreeDesk.com
Online	http://www.freedesk.com/
Price	Free
In short	It has good sharing capabilities, but FreeDesk is too slow to rely on.

NuoMedia

NuoMedia emulates Microsoft's successful range of office suites and takes it an extra step — online. The applications are directly compatible with all of Microsoft's products, but the interfaces have their own distinctive look and are not just clones of Word, Excel, PowerPoint and Outlook interfaces. Although they are Java applets, the file format for the word processor is HTML, and any files imported from Microsoft Word (or any other conventional office suite) either need to be converted to HTML format or cut and pasted to work in NuoMedia.

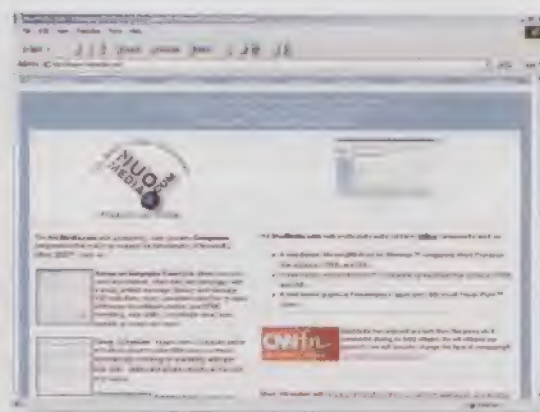
Registration with NuoMedia entitles you to 10M of server storage space in the application suite and an additional 10M when you register for the program's groupware applications. These offer a variety of email, address and scheduling features, as well as a member bulletin board for sharing files and data. The program is available in 23 languages.

NuoMedia is an update of the old Lotus eSuite. The applications are easy to work with, and the word processing pro-

gram has dictionary, spelling and word count options. Printing is also easy.

NuoMedia allows you to save copies of your applications and documents to your hard drive, allowing you to work without Internet access. Once you come back online, you can upload the work you completed offline. This feature is ideal for travellers, or if you wish to add some finishing touches to a spreadsheet on your notebook on the way to work. If you are unexpectedly cut off, the program does not allow you to save your work, but the applets stay open and you can rescue the work by cutting and pasting it to a PC-based application. FreeDesk doesn't have this feature, so unexpected interruptions when using it means a complete loss of work.

Site advertising is limited to an inhouse ad to "Put NuoMedia on your site or in your business!" which gets a little stale after the first few times you see it.



Even so, it is not overly obtrusive and is a small price to pay for an impressive free online office suite.

Contact	NuoMedia
Online	http://www.nuomedia.com/
Price	Free
In short	An adequate online office suite with impressive additional groupware applications.

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ThinkFree Office

ThinkFree Office is the most promising of the online office suites reviewed by APC. Its clean and uncluttered design makes it easy to use.

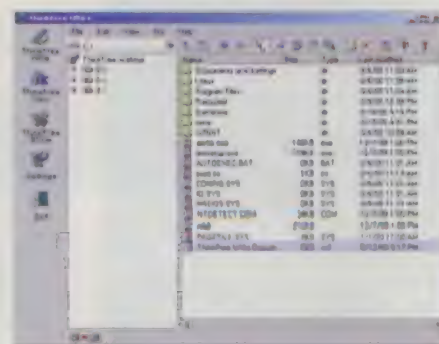
What sets ThinkFree apart from the rest is the 100% Java suite, which gives you the option of working online or off. To work offline, you download the 8M program to your hard drive. It then appears as an icon on your desktop. Unless you need to access files from the server, you can simply click on the icon and work on your documents without logging on. Files created this way can only be saved locally. If you are planning to work on your documents elsewhere, you should create them online and save them to the ThinkFree server.

The File Manager is like Microsoft Explorer in appearance, and it enables you to access local, network or server-based files at a glance. There is a good variety of file formats available. In the ThinkFree Write word processing program, documents can be saved in the proprietary

ThinkFree Write, HTML, rich text, plain text or Word formats. The spreadsheet function allows you to save pages in Excel or the proprietary ThinkFree Calc files. The PowerPoint-like presentation program has HTML or PowerPoint format files as well as the proprietary ThinkFree Show file type.

The applications have more features than the other suites reviewed, and these place ThinkFree almost on a par with Microsoft Office. For those accustomed to using Word, the transition to ThinkFree Write should be relatively smooth, as the interfaces are almost identical. Like any of the online office suites reviewed, ThinkFree Office allows you to deal with Windows documents and email attachments without running Windows.

If online office suites are really going to threaten the existing hard drive-based applications we know and depend on, they will need to offer similar features to those already available, *and more*. Of all the suites reviewed by APC, ThinkFree



Office is the one most likely to succeed in this respect. It certainly stands out as the most dependable and workable option.

Contact	ThinkFree.com
Online	http://www.thinkfree.com/
Price	Free
In short	A professional office suite with both online and offline capabilities.

Editor's Choice



ThinkFree Office

Highly commended
NuoMedia

Of the online office suites currently available, ThinkFree Office has the best and most efficient range of applications, in an easy-to-use format. The option of working offline is useful, because you don't have to stay connected to the Net for the duration of your document

preparation. ThinkFree is a solid introduction to the concept of an online office suite.

NuoMedia is not quite up to the standard of ThinkFree Office, but its added extras make it an interesting alternative to hard drive-based applications.

Free for download: MyFreeOffice

MyFreeOffice is a free office suite which is available for download. It helps you create an online presence for your business with its commercial Web site creation hints and incentives for its members. Included is the MyFreeSoftware suite of offline software applications which you need to download.

MyFreeSoftware consists of a word processor, database, spreadsheet and drawing program, which all look remarkably similar to their Microsoft counterparts. The best feature of the suite is that its applications support far more file formats than any of the other suites reviewed by APC.

MyFreeOffice does have a free software package, but the site is clearly a money-making venture. There is even an incentive scheme where you are encouraged to "sponsor" the registration



of 30 or more of your friends and acquaintances, so they can create their own commercial Web sites. If any of your friends take you up on the offer, you earn a percentage of the advertising revenue raised by each of their sites. However, you can register a basic package which does not include the commissions program.

The most obvious drawback to MyFreeOffice is that its applications suite is not online. This means that you are still limited to using applications and editing documents on the PC to which the suite has been downloaded. Similarly, files can only be saved and retrieved locally.

MyFreeOffice is smaller than conventional office applications, but it has no other advantages. Sun StarOffice 5.1 is a better offline office suite, and it's also free.

Contact	MyFreeOffice Online
Online	http://www.myfreeoffice.com/
Price	Free
In short	No match for conventional suites.

Still not convinced?

If you don't fancy shifting your office applications to an online address, there are several sites that provide online file storage only. By uploading files from your local PC, you can store them in a password-protected account and work on them from any Internet-connected PC or device, using a conventional hard drive-based office suite. The principle is the same as that behind online office suites, but you need an office suite program on your PC to open the files. These sites also provide an email account, address book and calendar.

Desktop.com

This site enables you to create your own individual online desktop with pictures, icons and links to Web sites. It can be tailored in much the same way as the desktop interface of your local PC. You can access your online desktop from any Internet-connected PC or device.

When you register, you are given 10M of space, which you can use for video, music or audio downloads, or for accessing uploaded files from your hard disk. You can organise your files into folders and subfolders, and for the uninitiated, there is comprehensive help on file management.



You can also establish file sharing with friends or colleagues.

The DeskPad function has little more than the basic typing functions you find with WordPad, but it's a handy feature for creating brief notes and documents in a hurry.

Contact
Online

Desktop.com
<http://www.desktop.com/>

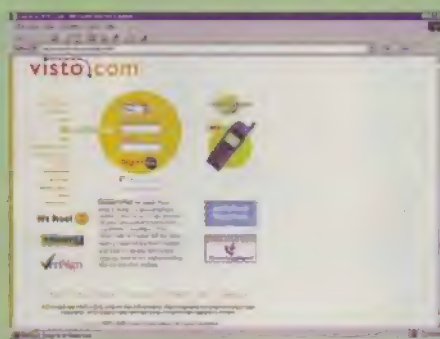
Price
In short

Free
Desktop.com has a variety of features, but 10M may not be enough space for some people.

Visto.com

A lot of thought has gone into this site — it's a one-stop shop for when you need to keep your files and important information at hand. There is a strong emphasis on collaboration, with file sharing, conference call setup and calendar sharing all provided. The group creation feature allows you to invite friends or colleagues to share and create files, contribute to your calendar, address book, message board and photo album. Varying degrees of access can be arranged.

The file storage feature allows you 15M for personal files and 25M for each group



you choose to create. If additional storage is required, it can be purchased on request.

The basic package is free and available when you register with the Web site.

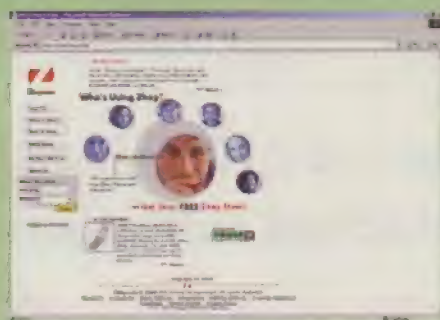
For the ultimate in remote access, the site also has instructions on how to set up your mobile phone to access the site and retrieve email, calendar information and to-do lists.

Contact
Online
Price
In short

Visto.com
<http://www.visto.com/>
Free
Visto.com provides a good package for keeping your work mobile.

Zkey

The main idea behind the Zkey site is that you create a personal information database for others to learn more about you. When you register, you select an individual 'Zkey', which is your personal identification code word or number. This provides others with access to selected information and contact details. The manufacturers suggest printing your Zkey on business cards to keep colleagues and clients up to date with your details. You can update your Zkey information whenever your details change. It's a cute enough idea, but surely phone calls to inform colleagues or clients would be a more professional way of doing business.



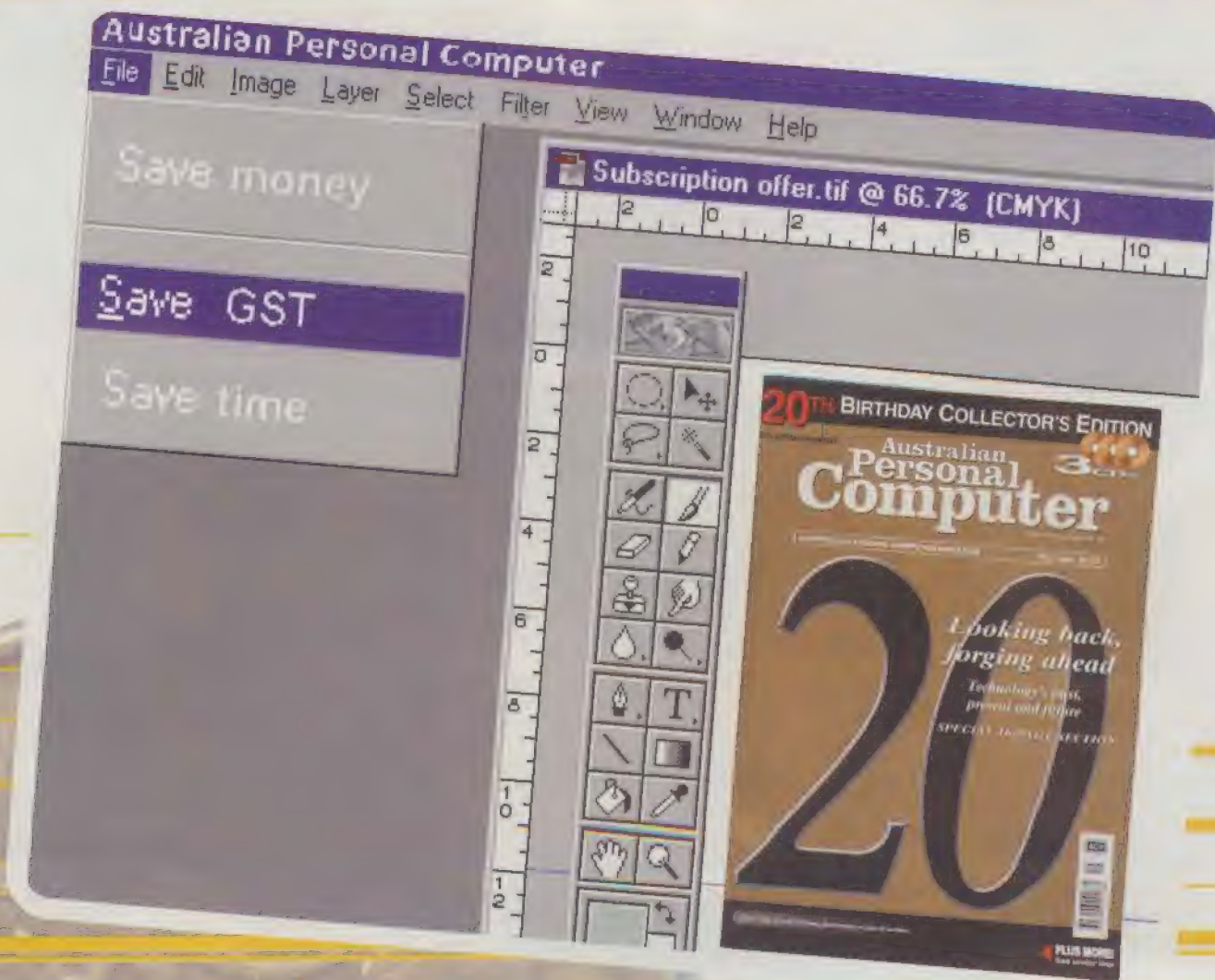
The site also has file storage, email, a calendar and an address book. The file

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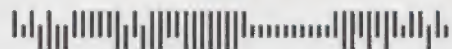


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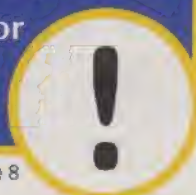
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The third dimension

Games are pushing the video card development cycle faster and faster every year. It's no longer enough just to have a fast chip on your video card; it has to be packed with RAM. If you're after a new 3D video card, get the low-down from APC's annual roundup of the latest and greatest. **By Darren Ellis**

There have been some interesting developments in video cards in the past year. The market is now at the point where high-end consumer video cards have the same amount of RAM as a basic PC. The recent proliferation of DDR (Double Data Rate) RAM on video cards has allowed cards to run faster than ever before. However, reports indicate that the latest graphics processors (on the GeForce2 GTS, for example) run much too fast for the RAM to keep up. This is the first time that memory has been overtaken in the speed stakes.

DDR is a new technology that effectively doubles the amount of information processed by the card. Normal SDRAM/VRAM/GRAM is SDR (Single Data Rate), which means that it's only

capable of processing information on the rising edge of a clock cycle, whereas DDR is capable of processing information on both the rising and falling edges of the cycle. Therefore, 150MHz clock speed DDR is for all intents and purposes the equivalent of 300MHz SDR.

The only hitch with DDR RAM is that it's expensive. As a result, most cards with DDR RAM only have 32M, and usually only GeForce256-based cards have 64M. Now that the faster GeForce2 has been released, APC is looking forward to testing a 64M DDR GeForce2 card (currently GeForce2 cards are only available with 32M). The cost of the extra DDR RAM will increase the price of a 64M GeForce2 card to almost \$1,000, which many people will find hard to accept.

Rather than adding more or faster RAM, ATI and 3dfx have taken a different approach to speeding up graphics processing. Their latest cards — ATI's Rage Fury MAXX and Voodoo5 5500 both feature dual processors. This may be too much of a strain for the AGP slots on some systems; only the 3dfx has a separate power input. APC hoped to receive a Voodoo5 5500 in time for this review, but at the last minute 3dfx ran into quality problems that have delayed the general release of the card (but it will be available later this year). The ATI Rage Fury MAXX is available now, but APC had problems testing it (see 'Rage and fury', page 100).

Matrox and VideoLogic are also due to release new cards soon. The Matrox G450 card does not represent a great leap for-



ward from the current G400 line. It has a slightly faster clock speed (due to smaller 0.18-micron die size), DDR RAM, an integrated digital flat panel (DFP) connector and a tweak to the secondary RAMDAC to allow greater resolution. This card is aimed at the business market and Matrox is emphasising features rather than performance. VideoLogic would have released the Neon 250 card last year, but the Sega Dreamcast exhausted the supply of the graphics chips that were to power it. By the time the VideoLogic cards were ready for Australian release, the nVidia GeForce had been released, so VideoLogic cancelled the Australian distribution. In the next few months, VideoLogic will release a card that it claims will equal or better the GeForce2.

How we tested

To test the performance of the video cards submitted for review, APC Labs used a combination of the Ziff-Davis **3D WinBench 2000** and **WinBench 99** suites of benchmark software; MadOnion's **3DMark2000** and **Video2000** tests **SPECviewperf**; and a couple of gaming timedemos.

The video cards were tested on two Dell Dimension XPS-T systems with 128M of RAM, a 13G IDE hard disk drive, a DVD-ROM drive and Windows 98. They were identical except for processor speeds; the first machine had a 600MHz Pentium III processor and the second had an 800MHz processor. The test results for each processor speed can be seen on pages 102 and 104.

WinBench 99 contains a set of sub-tests, each designed to find out the real speed of each component of a system. Two of the video playback tests from this benchmark were used, as well as the Business and High-End Graphics tests. These measure the card's graphics performance when executing 2D video tasks associated with common business applications, as well as demanding multimedia and 3D applications.

3D WinMark 2000 tests the 3D qualities of a card, right down to the nuts and bolts of individual capabilities (see quality test results on the CD) and returns a score based on tests run at various resolutions.

3DMark2000 tests 3D accelerators in a real world environment, designed to simulate the demands of games and applications.

Video2000 is a system-wide benchmark that tests a machine's overall video capabilities. It rates functions such as rendering and video decoding. This returns four scores based on the card's features, performance, quality and overall score. This test is usually used to test standalone machines, but is perfect for comparing the operation of video cards in the same system.

In the same way that Graphics WinBench profiles the GDI calls made by the applications, **SPECviewperf** profiles OpenGL calls made by a set of workstation applications to test the 3D graphics capabilities of a system. It extracts the OpenGL instructions delivered by applications during the run of a script, and repeats those instructions without any other application overhead.

Its standard run consists of five applications (Viewsets): Advanced Visualiser (AWadvs-03), DesignReview (DRV-06), Data Explorer (DX-05) and Lightscape (Light-03). The results are a weighted frame rate achieved in each viewset.

viewperf is more of a test of the geometry capabilities of a system than a rendering test. However, games tend to have high rendering demands and low geometry demands. As a result, in most circumstances, viewperf results indicate more about the system processor than the graphics card, unless, like the GeForce 256, the graphics card has a geometry engine onboard.

TreeMark is a simple rendering test that draws a 3D tree with multiple leaves, branches and moving light sources. There are two versions of the test: simple and complex. The difference is in the number of branches, dynamic light sources, leaves and texture complexity. As this benchmark was written by nVidia to showcase the capabilities of the GeForce chip, non-GeForce video cards tend to produce lower results.

APC Labs ran **Quake III Arena** timedemo, which counts the average frames per second (fps) a card takes to run the demo, at 1,024 by 768 at 16 bit. We also ran the **Expendable** timedemo, which not only counts the average fps, but also reports on the minimum fps achieved. This minimum fps score is the most important, because it reflects the card's performance rendering complex scenes.

All the cards tested are versions available to the general public at the time of publication unless otherwise stated.

Information contained in this article is based on products and specifications supplied to APC by distributors at the time of writing. Readers should check current pricing and specifications with distributors.

These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation or warranties as to the results. WinBench is a registered trademark of the Ziff-Davis Publishing Company.

Asus AGP-V6600 Pro64

Representatives from Asus video card distributor Cassa said that this is the first GeForce256 card with 64M of DDR RAM. It is certainly the only one APC has seen with that much DDR RAM. The extra memory and the fact that it is DDR gave the card a boost in the test suites.

In most of the tests, on both the 800MHz and 600MHz test machines, the AGP-V6600 came in just behind the GeForce2 cards. However, it outperformed them in some tests, particularly in the Video2000 performance score and the Expendable timedemo on the 800MHz system, where the card came second and first respectively.

It also excelled in the Ziff-Davis Business and High-End Graphics WinMark 99 on both test systems, which indicates that it is also powerful at 2D rendering.

Not only is the card fast and capable, but it's good value for a 64M GeForce card. As with most Asus cards, you can upgrade it to use with 3D stereoscopic glasses.

Contact	Cassa
Phone	(07) 5445 2992
Price	\$499
Online	http://www.asus.com.tw/
In short	A very good card that takes full advantage of its 64M DDR RAM.



Asus AGP-V7700

The AGP-V7700 is one of the two GeForce2 video cards to be submitted to APC Labs for review. The GeForce2 chip features a few improvements on the original, including a smaller micron size in the processor, faster memory bandwidth and a tweaked transform and lighting (T&L) engine. This means a better performance than the GeForce, but GeForce2 cards are expensive.

The two Asus cards were neck and neck in many tests, but despite having half the RAM, the GeForce2 chip put the AGP-V7700 ahead. The AGP-V7700 and the Creative GeForce2 card led in many tests, particularly in the 3D tests and the

gaming timedemos. The AGP-V7700 had extremely high frame rates in the gaming tests. It also had the highest score by a large margin in both of the Video2000 overall and quality categories.

Contact	Cassa
Phone	(07) 5445 2992
Price	\$690
Online	http://www.asus.com.tw/
In short	An excellent card, with tremendous 3D capabilities, but it's expensive.



Rage and fury

The ATI Rage Fury MAXX caused APC staffers some frustration. The installation CD crashed every time we tried to install the card and ATI did not provide new drivers for this card on its Web site.

The card wouldn't work in either test system — not even after formatting and a fresh reinstall of Windows 98. Using an alternative MAXX card didn't help either.

The Rage Fury MAXX has two graphics chips and twice the memory of the ATI Rage Fury. Each processor has 32M of SGRAM, but two processors don't translate into twice the speed. The card's processors render alternative frames. This reportedly produces faster performance, but is not significantly faster.

Creative Labs 3D Blaster GeForce2 GTS

The Creative Labs 3D Blaster GeForce2 GTS performed exceptionally well in the tests on both the 800 and 600MHz machines. It jostled with the other GeForce2 card, the Asus AGP-V7700, in the testing suites.

This card was first in the Video2000 performance and in the Quake III Arena timedemo and TreeMark tests. It blitzed all the other cards in the simple TreeMark test, and was slightly ahead of the AGP-V7700 in the TreeMark complex test. The card was equal first with the Asus AGP-V6600 and Leadtek WinFast GeForce256 card in the Expendable test (for both the maximum and minimum frame rates). These results indicate that the card is strong in 3D processing, and its scores in both the Ziff-Davis 2D tests reflect good 2D performance.

Like all GeForce2 cards, the Creative Labs 3D Blaster GeForce2 GTS is expensive;

the Asus AGP-V7700 is more than \$100 cheaper.

Contact	Creative Labs
Phone	(02) 9666 6100
Price	\$799
Online	http://www.australia.creative.com/
In short	A great card, but a little too expensive.



Diamond Viper II

The Viper II is the only card in this review to feature a Savage2000 processor. APC has previously reviewed the Viper II (see APC February, page 30). It's a good card, but it has weaknesses in some important areas. This is apparent when it's compared to GeForce. The Savage2000, like the GeForce family of chips, is capable of hardware T&L. This gave it a 3D boost, but it still fell short of the power of the nVidia chips.

This card has average 2D and 3D performance. Its strengths were in the MadOnion Video2000 test where it scored well in the features, quality and overall categories, but it was last in the Video2000 performance

category. This indicates that the quality of the card is high, but also that it is slow.

MPEG video playback was strong. The card can also be used as a DVD decoder, and this worked well in APC's tests.

The Viper II performs well and is much cheaper than its faster rivals.

Contact	Chips & Bits
Phone	(03) 9696 1911
Price	\$430
Online	http://www.diamondmm.com/
In short	A good card and not too costly.



Matrox Marvel G400-TV

This is an old card, but it's worthy of inclusion because the soon-to-be-released G450 cards don't represent a great jump forward. This card and chip have performed exceptionally well in the past (it was an Editor's Choice winner in the TV capture cards review, APC March, page 120). It's slower than the GeForce cards, but it's packed full of features.

In some of the tests, its results were higher than APC expected, considering that the card was released and designed well before the DDR revolution and before the release of the GeForce. Although it has 16M of RAM, compared to the other cards' minimum 32M of RAM, it achieved high

scores in the Ziff-Davis Business and High-End Graphics WinMark 99. In the 3D tests it trailed the rest, but still managed playable frame rates in the 3D game tests.

Its graphics performance is below average, but it has unparalleled features. The TV tuner is excellent, especially when displaying full screen, and the TV capture is brilliant. This card has a great mix of 2D, 3D and TV features.

Contact	Focal Point Computing
Phone	(03) 9372 6600
Online	http://www.matrox.com/
Price	\$752
In short	Excellent for every purpose.



Leadtek WinFast GeForce256

The Leadtek WinFast GeForce256 is an expensive card, in the same realm as the Creative 3D Blaster GeForce2 and Asus AGP-V7700, but it has some redeeming features. It has 64M of DDR RAM and 350MHz RAMDAC, which helped it to rate highly in some tests. It is very strong at rendering 2D images as evident in the high scores for both the Ziff-Davis Business and High-End WinMark 99.

The card rated well in the Video2000 test and also scored highly in the 3D WinBench 2000 and 3DMark2000. In the gaming tests on both machines, the WinFast GeForce256's frame rates were equal first in the Expendable timedemos, and high in both Quake III Arena timedemos.

It's an excellent card for gaming, but it is difficult to decide whether the extra



32M of DDR RAM is really worth the added cost.

Contact	BCN Technology
Phone	(02) 9417 3688
Online	http://www.bcnitech.com/
Price	\$799
In short	A little too expensive, but powerful.

Editor's Choice

Asus AGP-V6600 Pro64



Highly commended

Asus AGP-V7700

The cards based on the GeForce2 GTS chip were too expensive to win Editor's Choice, but they are at the cutting edge of graphics cards and great if you can afford them. For sheer graphics-crunching ability and speed, APC awarded the Asus GeForce2 card Highly commended.

Almost as fast, and nearly half the price, the Asus AGP-V6600 Pro64 is a clear Editor's Choice winner. With a speedy processor and whopping 64M of DDR RAM, the AGP-V6600 can carve a path through any 3D tasks you throw its way.

Video cards: Test results on the 600MHz system

3D WinBench 2000			Business Graphics WinMark 99			WinBench 99 video tests 4.1. 640 by 480, 30fps, 900Kps: frames dropped		
Card	Result	Card	Result	Card	Result	Card	Result	Card
Leadtek WinFast GeForce256	67.3	Matrox Marvel G400-TV	266	Creative Labs 3D Blaster GeForce2 GTS	766	Diamond Viper II Z200	0	
Asus AGP-V7700	64.3	Asus AGP-V7700	261	Asus AGP-V6600 Pro64	763	Leadtek WinFast GeForce256	0	
Creative Labs 3D Blaster GeForce2 GTS	63.2	Asus AGP-V6600 Pro64	260	Leadtek WinFast GeForce256	760	Matrox Marvel G400-TV	5	
Asus AGP-V6600 Pro64	38.1	Creative Labs 3D Blaster GeForce2 GTS	260	Asus AGP-V7700	757	Asus AGP-V6600 Pro64	9	
Diamond Viper II Z200	36.8	Leadtek WinFast GeForce256	260	Matrox Marvel G400-TV	745	Asus AGP-V7700	17	
Matrox Marvel G400-TV	25.9	Diamond Viper II Z200	248	Diamond Viper II Z200	664	Creative Labs 3D Blaster GeForce2 GTS	17	
WinBench 99 video tests MPEG-1, 352 by 240, 300Kps: CPU utilisation (%)			WinBench 99 video tests MPEG-1, 30fps, 300Kps: frames dropped			3D Mark2000		
Card	Result	Card	Result	Card	Result	Card	Result	Card
Diamond Viper II Z200	19.9	Diamond Viper II Z200	174	Asus AGP-V7700	1	Asus AGP-V7700	5,238	
Leadtek WinFast GeForce256	19.9	Leadtek WinFast GeForce256	84.9	Asus AGP-V6600 Pro64	1	Creative Labs 3D Blaster GeForce2 GTS	4,978	
Matrox Marvel G400-TV	26.7	Matrox Marvel G400-TV	81.8	Diamond Viper II Z200	1	Leadtek WinFast GeForce256	4,270	
Asus AGP-V7700	27.1	Asus AGP-V6600 Pro64	74	Leadtek WinFast GeForce256	1	Asus AGP-V6600 Pro64	3,831	
Asus AGP-V6600 Pro64	27.1	Creative Labs 3D Blaster GeForce2 GTS	72.6	Creative Labs 3D Blaster GeForce2 GTS	2	Diamond Viper II Z200	3,074	
Creative Labs 3D Blaster GeForce2 GTS	27.4	Asus AGP-V7700	71.9	Matrox Marvel G400-TV	3	Matrox Marvel G400-TV	2,718	
Video2000: overall score			Video2000: quality			Video2000: performance		
Card	Result	Card	Result	Card	Result	Card	Result	Card
Diamond Viper II Z200	2,235	Matrox Marvel G400-TV	992	Creative Labs 3D Blaster GeForce2 GTS	771	Diamond Viper II Z200	682	
Matrox Marvel G400-TV	2,232	Asus AGP-V7700	834	Diamond Viper II Z200	756	Asus AGP-V7700	599	
Asus AGP-V7700	2,184	Diamond Viper II Z200	796	Matrox Marvel G400-TV	754	Asus AGP-V6600 Pro64	586	
Creative Labs 3D Blaster GeForce2 GTS	2,149	Creative Labs 3D Blaster GeForce2 GTS	792	Asus AGP-V7700	752	Creative Labs 3D Blaster GeForce2 GTS	586	
Leadtek WinFast GeForce256	2,093	Leadtek WinFast GeForce256	791	Asus AGP-V6600 Pro64	716	Leadtek WinFast GeForce256	586	
Asus AGP-V6600 Pro64	2,091	Asus AGP-V6600 Pro64	789	Leadtek WinFast GeForce256	716	Matrox Marvel G400-TV	486	
Expendable: lowest fps			Expendable: average fps			Quake III: 1.024 by 768 at 16 bit		
Card	Result	Card	Result	Card	Result	Card	Result	Card
Creative Labs 3D Blaster GeForce2 GTS	34	Asus AGP-V6600 Pro64	56	Asus AGP-V7700	88.1	Creative Labs 3D Blaster GeForce2 GTS	64	
Leadtek WinFast GeForce256	34	Creative Labs 3D Blaster GeForce2 GTS	56	Creative Labs 3D Blaster GeForce2 GTS	85.1	Asus AGP-V7700	42.4	
Asus AGP-V6600 Pro64	33	Leadtek WinFast GeForce256	56	Leadtek WinFast GeForce256	78.4	Asus AGP-V6600 Pro64	42	
Matrox Marvel G400-TV	33	Asus AGP-V7700	54	Asus AGP-V6600 Pro64	68.5	Leadtek WinFast GeForce256	39.1	
Asus AGP-V7700	31	Matrox Marvel G400-TV	53	Diamond Viper II Z200	53.1	Diamond Viper II Z200	9.4	
Diamond Viper II Z200	27	Diamond Viper II Z200	46	Matrox Marvel G400-TV	39.6	Matrox Marvel G400-TV	8.1	
TreeMark complex: fps			viewperf: DX-05			viewperf: Awadys-03		
Card	Result	Card	Result	Card	Result	Card	Result	Card
Creative Labs 3D Blaster GeForce2 GTS	20.4	Asus AGP-V6600 Pro64	28.45	Asus AGP-V6600 Pro64	68.35	Asus AGP-V6600 Pro64	22.39	
Asus AGP-V7700	17	Creative Labs 3D Blaster GeForce2 GTS	28.02	Creative Labs 3D Blaster GeForce2 GTS	65.35	Creative Labs 3D Blaster GeForce2 GTS	22.39	
Asus AGP-V6600 Pro64	12.1	Asus AGP-V7700	27.68	Leadtek WinFast GeForce256	52.32	Leadtek WinFast GeForce256	20.69	
Leadtek WinFast GeForce256	11.4	Leadtek WinFast GeForce256	22.63	Asus AGP-V7700	49.53	Asus AGP-V7700	20.31	
Diamond Viper II Z200	2.1	Matrox Marvel G400-TV	8.04	Matrox Marvel G400-TV	10.08	Diamond Viper II Z200	6.97	
Matrox Marvel G400-TV	1.65	Diamond Viper II Z200	7.52	Diamond Viper II Z200	9.35	Matrox Marvel G400-TV	5.58	

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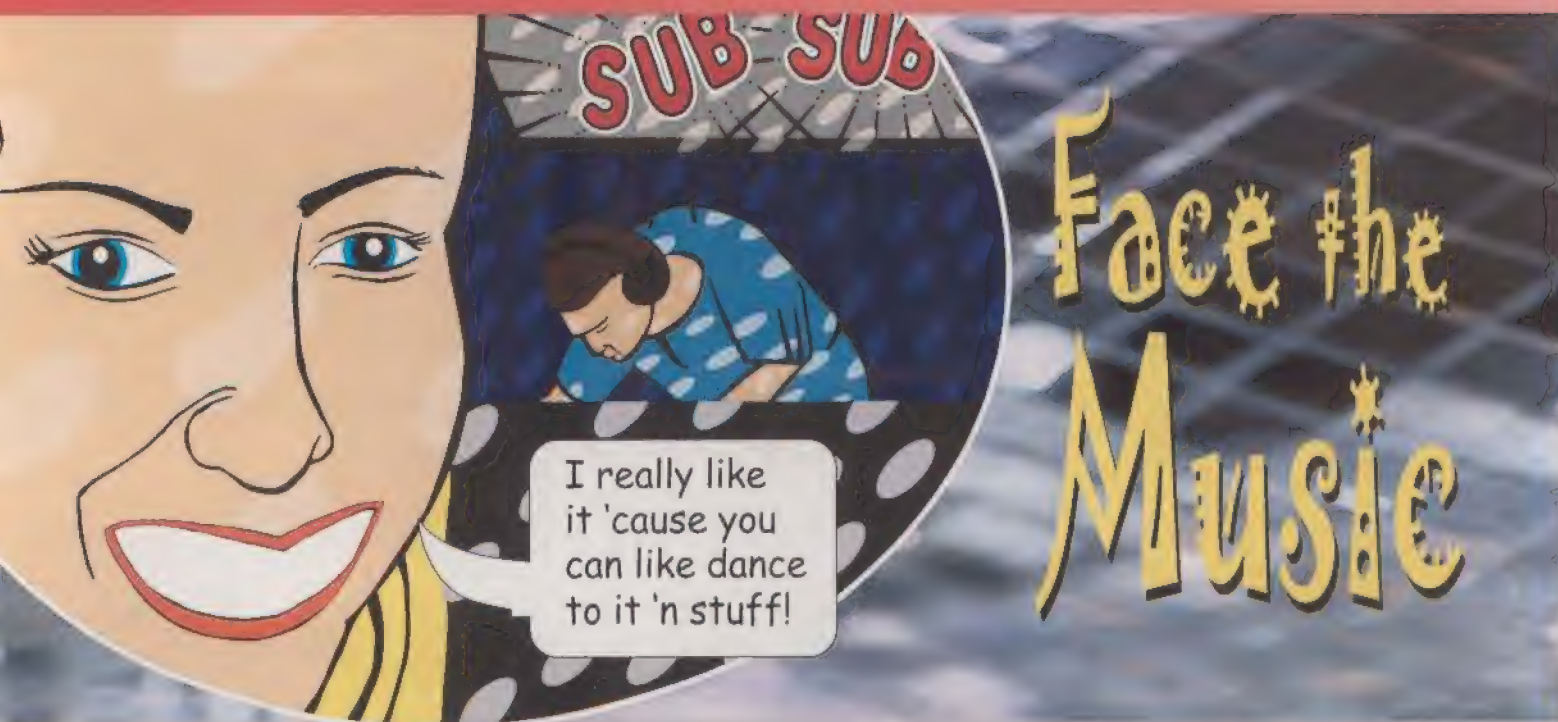
Video cards: Test results on the 800MHz system

3D WinBench 2000			Business Graphics WinMark 99			High End Graphics WinMark 99			WinBench 99 video tests 4.1, 640 by 480, 30fps, 900Kps: frames dropped		
Card	Result	Card	Result	Card	Result	Card	Result	Card	Result	Card	Result
Asus ACP-V7700	93.9	Matrox Marvel G400-TV		Asus ACP-V6600 Pro64	346	Asus ACP-V7700	1,020	Asus ACP-V7700	1,020	Asus ACP-V7700	0
Creative Labs 3D Blaster GeForce2 GTS	91	Leadtek WinFast GeForce256		Asus ACP-V7700	345	Creative Labs 3D Blaster GeForce2 GTS	1,010	Creative Labs 3D Blaster GeForce2 GTS	1,010	Creative Labs 3D Blaster GeForce2 GTS	0
Leadtek WinFast GeForce256	68.2	Asus ACP-V7700		Asus ACP-V6600 Pro64	341	Leadtek WinFast GeForce256	1,010	Matrox Marvel G400-TV	1,010	Matrox Marvel G400-TV	0
Asus ACP-V6600 Pro64	53.1	Asus ACP-V6600 Pro64		Asus ACP-V7700	341	Leadtek WinFast GeForce256	991	Diamond Viper II Z200	991	Diamond Viper II Z200	0
Diamond Viper II Z200	51.5	Creative Labs 3D Blaster GeForce2 GTS		Asus ACP-V7700	338	Matrox Marvel G400-TV	882	Leadtek WinFast GeForce256	882	Leadtek WinFast GeForce256	0
Matrox Marvel G400-TV	32.2	Diamond Viper II Z200		Asus ACP-V7700	328	Diamond Viper II Z200					
WinBench 99 video tests MPEG-1, 352 by 240, 300Kps: CPU utilisation (%)			WinBench 99 video tests MPEG-1, 30fps, 300Kps, max frame rate			WinBench 99 video tests MPEG-1, 30fps			3D Mark2000		
Card	Result	Card	Result	Card	Result	Card	Result	Card	Result	Card	Result
Asus ACP-V7700	13.8	Diamond Viper II Z200		Asus ACP-V7700	208	Asus ACP-V7700	450	Asus ACP-V7700	450	Asus ACP-V7700	6,156
Creative Labs 3D Blaster GeForce2 GTS	13.8	Matrox Marvel G400-TV		Asus ACP-V6600 Pro64	143	Creative Labs 3D Blaster GeForce2 GTS	450	Creative Labs 3D Blaster GeForce2 GTS	450	Creative Labs 3D Blaster GeForce2 GTS	5,727
Leadtek WinFast GeForce256	14.1	Asus ACP-V6600 Pro64		Asus ACP-V7700	74.1	Creative Labs 3D Blaster GeForce2 GTS	450	Leadtek WinFast GeForce256	450	Leadtek WinFast GeForce256	4,623
Asus ACP-V6600 Pro64	14.2	Creative Labs 3D Blaster GeForce2 GTS		Asus ACP-V7700	73.9	Matrox Marvel G400-TV	450	Asus ACP-V6600 Pro64	450	Asus ACP-V6600 Pro64	4,062
Matrox Marvel G400-TV	15.5	Asus ACP-V7700		Asus ACP-V7700	73.3	Diamond Viper II Z200	450	Diamond Viper II Z200	450	Diamond Viper II Z200	3,391
Diamond Viper II Z200	16.4	Leadtek WinFast GeForce256		Asus ACP-V7700	73.8	Leadtek WinFast GeForce256	450	Matrox Marvel G400-TV	450	Matrox Marvel G400-TV	2,902
Video2000: overall score			Video2000: quality			Video2000: performance			Video2000: features		
Card	Result	Card	Result	Card	Result	Card	Result	Card	Result	Card	Result
Asus ACP-V7700	2,533	Asus ACP-V7700		Asus ACP-V7700	1,075	Creative Labs 3D Blaster GeForce2 GTS	898	Diamond Viper II Z200	898	Diamond Viper II Z200	682
Asus ACP-V6600 Pro64	2,490	Asus ACP-V6600 Pro64		Asus ACP-V6600 Pro64	1,029	Asus ACP-V6600 Pro64	875	Asus ACP-V7700	875	Asus ACP-V7700	599
Diamond Viper II Z200	2,345	Diamond Viper II Z200		Asus ACP-V7700	879	Asus ACP-V7700	859	Asus ACP-V6600 Pro64	859	Asus ACP-V6600 Pro64	586
Creative Labs 3D Blaster GeForce2 GTS	2,276	Creative Labs 3D Blaster GeForce2 GTS		Asus ACP-V7700	792	Leadtek WinFast GeForce256	855	Creative Labs 3D Blaster GeForce2 GTS	855	Creative Labs 3D Blaster GeForce2 GTS	586
Leadtek WinFast GeForce256	2,231	Leadtek WinFast GeForce256		Asus ACP-V7700	789	Matrox Marvel G400-TV	841	Leadtek WinFast GeForce256	841	Leadtek WinFast GeForce256	586
Matrox Marvel G400-TV	2,066	Matrox Marvel G400-TV		Asus ACP-V7700	740	Diamond Viper II Z200	784	Matrox Marvel G400-TV	784	Matrox Marvel G400-TV	486
Expendable: lowest fps			Expendable: average fps			Quake III: 1,024 by 768 at 16 bit			TreeMark simple: fps		
Card	Result	Card	Result	Card	Result	Card	Result	Card	Result	Card	Result
Asus ACP-V6600 Pro64	44	Asus ACP-V6600 Pro64		Asus ACP-V6600 Pro64	70	Creative Labs 3D Blaster GeForce2 GTS	107.1	Creative Labs 3D Blaster GeForce2 GTS	107.1	Creative Labs 3D Blaster GeForce2 GTS	71.3
Creative Labs 3D Blaster GeForce2 GTS	44	Creative Labs 3D Blaster GeForce2 GTS		Asus ACP-V7700	70	Asus ACP-V7700	104.6	Asus ACP-V7700	104.6	Asus ACP-V7700	58
Leadtek WinFast GeForce256	44	Leadtek WinFast GeForce256		Asus ACP-V7700	70	Leadtek WinFast GeForce256	82.5	Asus ACP-V6600 Pro64	82.5	Asus ACP-V6600 Pro64	42
Asus ACP-V7700	42	Asus ACP-V7700		Asus ACP-V6600 Pro64	67.2	Asus ACP-V6600 Pro64	69.4	Leadtek WinFast GeForce256	69.4	Leadtek WinFast GeForce256	37
Matrox Marvel G400-TV	36	Diamond Viper II Z200		Diamond Viper II Z200	58	Diamond Viper II Z200	53.1	Diamond Viper II Z200	53.1	Diamond Viper II Z200	12.1
Diamond Viper II Z200	36	Matrox Marvel G400-TV		Asus ACP-V7700	54	Matrox Marvel G400-TV	39.9	Matrox Marvel G400-TV	39.9	Matrox Marvel G400-TV	10.1
TreeMark complex: fps			viewperf: DX-05			viewperf: Awadvs-03			viewperf: DRV-06		
Card	Result	Card	Result	Card	Result	Card	Result	Card	Result	Card	Result
Creative Labs 3D Blaster GeForce2 GTS	20.4	Asus ACP-V6600 Pro64		Asus ACP-V6600 Pro64	39.8	Creative Labs 3D Blaster GeForce2 GTS	86.87	Asus ACP-V6600 Pro64	86.87	Asus ACP-V6600 Pro64	29.67
Asus ACP-V7700	19	Creative Labs 3D Blaster GeForce2 GTS		Asus ACP-V6600 Pro64	37.57	Asus ACP-V6600 Pro64	74.75	Creative Labs 3D Blaster GeForce2 GTS	74.75	Creative Labs 3D Blaster GeForce2 GTS	28.42
Asus ACP-V6600 Pro64	12.1	Asus ACP-V7700		Asus ACP-V7700	34.17	Asus ACP-V7700	64.18	Asus ACP-V7700	64.18	Asus ACP-V7700	25.14
Leadtek WinFast GeForce256	11.2	Leadtek WinFast GeForce256		Leadtek WinFast GeForce256	32.2	Leadtek WinFast GeForce256	56.46	Diamond Viper II Z200	56.46	Diamond Viper II Z200	8.62
Matrox Marvel G400-TV	9.8	Matrox Marvel G400-TV		Matrox Marvel G400-TV	10.47	Matrox Marvel G400-TV	13.18	Matrox Marvel G400-TV	13.18	Matrox Marvel G400-TV	7.07
Diamond Viper II Z200	2.5	Diamond Viper II Z200		Diamond Viper II Z200	9.31	Diamond Viper II Z200	11.12	Leadtek WinFast GeForce256	11.12	Leadtek WinFast GeForce256	26.74

Specifications: Video cards

Product	Asus AGP-V6600 Pro64	Asus ACP-V7700	ATI Rage Fury MAXX	Creative Labs GeForce2 GTS	Diamond Viper II	Leadtek WinFast GeForce256	Matrox Marvel G400-TV
Contact	Cassa	Cassa	Servex	Creative Pacific	Chips and Bits	BCN Technology	Focal Point Computing
Phone	(07) 5445 2992	(07) 5445 2992	(02) 8762 3500	(02) 9906 8887	(03) 9696 1911	(02) 9417 3688	(03) 9525 1144
Online	http://www.asus.com/	http://www.asus.com/	http://www.servex.com.au/	http://www.cppl.com.au/	http://www.diamondmm.com/	http://www.bcntech.com/	http://www.matrox.com/
Price	\$499	\$690	\$490	\$549	\$430	\$799	\$752
Graphics processor	nVidia GeForce256	nVidia GeForce2 GTS	dual ATI Rage Pro GL chips	nVidia GeForce2 GTS	53 Savage 2000	nVidia GeForce256	Matrox G400
Video memory	64M DDR SGRAM	32M DÜR SGRAM	64M SDRAM (32M per chip)	32M DDR	32M SDRAM	32M DDR SGRAM	16M SGRAM
Processor/memory clock speed	120MHz/150MHz (300MHz)	200MHz/166MHz (332MHz)	125MHz/143MHz	200MHz/166MHz (332MHz)	125MHz/143MHz	120MHz/150MHz (300MHz)	Undisclosed
Maximum resolution/colour depth/refresh rate	2,048 by 1,536, 32 bit/60Hz	2,048 by 1,536, 32 bit/75Hz	1,600 by 1,200, 32 bit/90Hz	2,048 by 1,536, 32 bit/75 Hz	2,048 by 1,536, 16 bit/60Hz	2,048 by 1,536, 32 bit/75 Hz	2,048 by 1,536, 16 bit/85Hz
Maximum 3D resolution/colour depth/refresh depth/refresh rate	1,600 by 1,200/16 bit/100Hz	1,600 by 1,200/16 bit/100Hz	1,600 by 1,200/32 bit/90Hz	1,600 by 1,200/16 bit/100Hz	1,280 by 1,024/16 bit/85Hz	1,600 by 1,200/16 bit/100Hz	1,600 by 1,200/16 bit/100Hz
RAMDAC speed	350MHz	350MHz	300MHz	333MHz	350MHz	350MHz	300MHz
AGP type	4x/2x	4x/2x	4x/2x	4x/2x	4x/2x	4x/2x/1x	4x/2x
Output types:							
VGA 15-pin	Yes	Yes	Yes	Yes	Yes	Yes	Yes
S-Video (PAL/NTSC)	No	No	No	No	Yes	Yes	No
VR (for glasses)	No	No	No	No	No	No	No
RCA (composite)	No	No	No	No	Yes	No	No
PAL/NTSC	No	No	No	No	No	No	No
BNC	No	No	No	No	No	No	No
DDC (digital)	No	No	No	No	No	Yes	No
Dual monitor support (hardware)	No	No	No	No	No	No	Yes
Platforms supported	Windows 98 Windows NT	Windows 95/98, Windows NT, Windows 2000	Windows 98	Windows 95/98, Windows NT, Windows 2000	Windows 95/98, Windows NT 4.0 (and Windows 2000 when drivers are available)	Windows 95/98, Windows NT, Windows 2000	Windows 95/98
Bundled software	Drakan, Rollcage and 12 other games; DVD software	Drakan, Rollcage and 12 other games; DVD software	ATI DVD player, SonnetTech 3Deep	DVD decoder/player, Mediaring Talk, Creative LAVA and more	Trick Style and fire other games	DVD software	None
Other	Can upgrade to use with 3D glasses	Can upgrade to use with 3D glasses	N/A	N/A	N/A	N/A	N/A

AUDIO TOOLS



It's only in the last year or so that computer audio has become powerful enough to be taken seriously by professional musicians and studio engineers. It's also becoming affordable enough for non-professionals to use. **Daniel Potts** takes a peek at what's out there for the budding digital musician.

In the past, computers in music studios were used solely to control equipment like samplers, synthesisers and drum machines. But they've now begun to replace their outboard counterparts.

There are two main applications for computers in music: MIDI and audio. MIDI (musical instrument digital interface) allows computers to trigger events, such as note-on and note-off events, in MIDI-compliant instruments. Using computers for MIDI is not particularly demanding on the computer's resources, but it does require external MIDI instruments which can be very expensive. Applications that play MIDI files (sequences of MIDI notes) on the PC by synthesising the instruments and notes are common, but few PC configurations approach the quality of the real thing.

Computer audio, on the other hand, involves the direct manipulation of digital representations of waveforms, such as WAV and MP3 files. It doesn't require any equipment beyond a soundcard, but can be very demanding on the computer's resources. For this reason, computers have mainly been associated with MIDI applications while computer audio use has, until recently, remained modest. Of

course, software that caters to computer-based music does not always fit neatly into either category. Most MIDI programs have some audio support and vice versa. Most of the programs reviewed here have some MIDI support, but we will be focusing on their audio processing capabilities.

Audio editing

Audio editors can be used for recording live sounds directly from a microphone or stereo equipment, editing instrument recordings to use in a composition, making sound effects for your desktop or for mastering music or video soundtracks. However, while editors can be used to manipulate audio files, they aren't built for arranging them into compositions. For this, you need a wave sequencer.

Wave sequencers

Wave sequencers take audio files and arrange them into patterns. The first software wave sequencers were 'MOD trackers', designed for the Amiga and later for DOS. They are a modest but powerful

option for writing music on a computer without any external MIDI equipment.

Trackers are like the Linux of music software: old school and hard-core, and this is reflected in the music they produce. Getting good results requires programming skills because trackers are basically visual programming tools for music composition. Trackers are still widely used, but developments such as DirectX and ultra-fast CPUs have opened the door to things like real time audio processing and virtual synthesis — technologies only dreamed about in the tracker heyday.

Trackers are being written to utilise a lot of the audio power of Windows that was not available to their DOS predecessors, but they are not embracing the GUI possibilities with the same vigour. More advanced programs such as Buzz (<http://www.buzztrack.com/>) allow you to use real time virtual synths, drum machines and effects processors, but they are not easy to learn. Fortunately, there are many other programs available that offer the benefits of trackers without these steep learning curve.

All the tools in this review can be found on APC's July cover CDs.

AUDIO EDITORS

GoldWave 4.16

Until now, APC has never really taken GoldWave seriously. It's a simple and clunky-looking application, generally thought of as the Notepad of audio editing. However, Version 4.16 of this seemingly ancient program really does come to the party. It has real time VU meters and oscilloscopes, a good range of effects, and excellent selection logic: left-click for left indicator and right-click for right indicator. Why don't any of the other applications do this?

There's a built-in CD player for live recording, and GoldWave also includes two features that put all the other audio editors reviewed here to shame: CD extraction and full MP3 support. The CD ripping lets you digitally extract audio from CDs as fast as your CD-ROM can handle, and doesn't require manual editing of the tracks. You can then save them straight to MP3.

GoldWave's effects also represent amazing quality and flexibility. While APC was unimpressed with its inability to audition effects, it is the cheapest product

we looked at, and the effects are still remarkably good.

The dynamics processor is a genuine multiband limiter, and there are some unusual effects like 'mechanise' and 'Doppler' which give great results. The doppler effect lets you perform multiple 'movements' that simulate a moving sound source. This is essentially time stretching without finetuning.

The equaliser is good for all but the most precise applications and there's even a pop-and-click removal feature that is adequate, but not quite on a par with that of Sound Forge XP and Cool Edit 2000.

It was disappointing to find there are no reverb or pitch shifting effects, both of which are basic. The undo is also a little unpredictable at times, allowing some things to be undone and others not, so lots of copying, pasting and saving is needed to avoid losing sounds.

Finally, if you find that displaying left and right channels in different colours is a little too much, just go in and edit the colour preferences and you can have it



looking every bit as grey and 'professional' as Sound Forge XP.

GoldWave is a good basic editor, and if all you need to do is trim samples, do a minimum of tweaking, and maybe open and save MP3s, then this one's going to save you some cash. You also get CD ripping thrown in. If you plan to do audio mastering or a lot of effects processing or time stretching, then you'll need to spend a bit more and go with one of the others.

Contact	GoldWave
Online	http://www.goldwave.com/
Price	\$US40
In short	Excellent budget editor with full MP3 support.

HiSoft SoundProbe 1.4

At first, HiSoft SoundProbe 1.4 looks like a cross between Sound Forge XP and Cool Edit 2000, but there are differences. The first is the design of the selection function. Unlike most other audio programs, the selected area is not displayed in a different colour; instead a box is drawn around it. This way you can compare selected and unselected regions visually, without the optical distortion that can result from colour differences. It's a small point, but a sign that HiSoft has really thought about its design and not just emulated other editors.

SoundProbe has a CD controller which allows you to record from CD in real time, but it cannot rip from CDs. Its live recording controls are very good and allow you to record 'into' a selected region, as well as start recording when sound is detected.

There are about 10 effects included such as reverb, flange, distortion, echo, pitch shift and some interesting additions like the vocoder and comb filter. All effects can be previewed while you tweak their settings. You can then apply them to a new sound file, which is a useful feature not seen in any other editor. This means

you can test out interesting effects stumbled upon during tweaking without having to commit them to the file you are working on. SoundProbe also supports real time processing of any of its effects. You can take a live input and record it 'through' an effect to a new sound file, just like having a standalone effects processor. Even high-end audio editors don't usually provide this kind of flexibility.

The pitch shifting and time stretching are particularly good. There are several variables for finetuning adjustments and the quality is as good as that found in Sound Forge XP.

In addition to all the effects in SoundProbe, there is a good selection of enhancement features such as 'decrackle', 'denoise', 'dedick' and dynamics processing.

A couple of visual tools that give a real time analysis of sound are included in SoundProbe: the oscilloscope and spectrum analyser. There's also a simple but extremely useful batch processor for converting sound file types on multiple files.

APC found SoundProbe to be extremely impressive, especially for a first-genera-



tion program. The real time processing is excellent, as is the recording control. Basic editing is simple, but the interface may take a little getting used to. In contrast to all the other editors reviewed, SoundProbe supports MP3 saving only; and that's using the BladeEnc module, which isn't high quality. That aside, even with the higher price tag, SoundProbe has a lot that the other editors reviewed here do not.

Contact	HiSoft
Online	http://www.soundprobe.co.uk/
Price	£59.95 (about \$150)
In short	Expensive, but has lots of advanced features.

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AUDIO EDITORS

Sonic Foundry Sound Forge XP 4.5

Like Cool Edit 2000, Sonic Foundry Sound Forge XP 4.5 is a cut-down version of its professional counterpart, Sound Forge. XP 4.5 is certainly good, but the upgrade is very tempting.

Sound Forge XP has a bleak interface, but what it lacks in colour and texture it makes up for in accessibility. All the information and navigation tools you need are clearly visible and not cluttered with things you don't need.

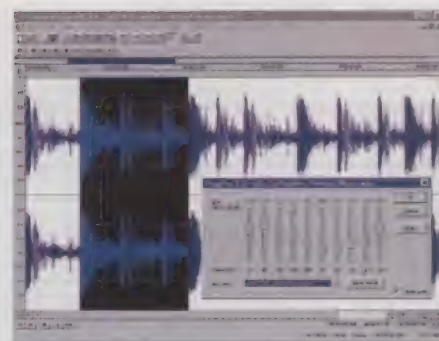
Performing standard sample editing is simple, but unlike Cool Edit 2000, XP has no automatic beat detection. There are only about eight built-in effects, but they are versatile and the quality is very good — especially the dynamics and reverb. Like Cool Edit 2000 and GoldWave, you can't preview these effects before applying them, but you can always use a selection instead of the whole file for doing your own auditioning. All of the effects are professional quality, the EQ and pitch shifting are particularly good, and if you're planning on using Acid you can also prepare your sounds' looping properties before loading them.

If you dabble in video editing, then you'll appreciate being able to open an AVI file and edit the soundtrack just like a regular audio file — with frame accuracy. This is much better than trying to do soundtrack mastering in video programs like Adobe Premiere or Ulead MediaStudio.

However, when it comes to MP3, Sound Forge XP is disappointing. It can open MP3 files but not save them. You can buy the Sonic Foundry MP3-saving add-on, but these days if MP3 support isn't standard then the application is chasing the pack. Even the budget-priced GoldWave supports saving as MP3.

For recording live input, XP supports multiple takes and 'punching in', with real time level meters to check your inputs. The only other program reviewed here that supports this is HiSoft SoundProbe 1.4. If you're planning to do a lot of live recording, Sound Forge XP is a definite candidate. It is worth noting, however, that there are no CD controls in XP, so recording from CD is fiddly.

For finalising and mastering tasks such as normalisation, EQ, compression and



fades, XP is excellent. There's not much you can't do here that you would be able to do in the Pro version, and once again the quality is excellent.

Sound Forge XP is a very professional product that is easy to use and offers very high quality audio processing. Its video support is an unusual but useful feature for those who need it, but its MP3 support is inadequate.

Contact	New Magic
Phone	(03) 9885 5888
Online	http://www.sonicfoundry.com/
Price	\$99
In short	Lacks MP3 support, but it is a very professional editor.

Syntrillium Cool Edit 2000

Cool Edit 2000 has a few features not found in the Cool Edit Pro version. It comes with 10 built-in effects such as noise reduction, equalisation and delay, and has integrated MP3 encoding and decoding — unlike Cool Edit Pro, in which MP3 handling is a commercial add-on. Cool Edit 2000 is fast, and this is definitely one of its drawbacks. It also has the advantage of being able to draw on a long history: there were versions of Cool Edit for Windows 3.1.

Cool Edit 2000 is intuitive to use, unlike several of the more expensive programs. It also has the 'find beats' feature, which is handy when you want to isolate drum sounds in beats, or words from sections of speech.

Other useful features of Cool Edit 2000 include the batch processor which is very powerful but a little tricky to learn, and the favourites, which allows you to customise hotkeys for frequent tasks. The floating 'waveforms list' box that allows you to preview and switch between open sounds is also valuable.

You can record from CD in Cool Edit 2000, but this is in real time and requires

playing the CD and recording it live. Don't get any ideas about CD ripping to MP3 with Cool Edit 2000 unless you're prepared to spend a lot of time doing it.

Editing tasks such as trimming, fading, copying, pasting and reversing are a breeze, and the effects are good quality. Cool Edit 2000's range of effects is on a par with the other editors reviewed. They include distortion, flange, reverb, equalisation, delay and time stretching. These were excellent, except for time stretching which was easy to use and versatile, but was not as good as that provided by Sound Forge XP or SoundProbe. To its credit, the built-in noise reduction was excellent, competing well with some professional applications.

When it comes to finalising a song and performing tasks such as normalisation, equalisation and compression, Cool Edit 2000 is fast and easy to use. As with most of these entry-level audio editors, there is no preview or audition feature for the effects. This means you can't simply tweak them while listening to them. The file format support covers all but the most obscure formats.



Cool Edit 2000 is a fast, stable and useful audio editor. It's great for doing straightforward edits and lots of them. You get a few more features than you do with GoldWave and Sound Forge XP, but you pay a bit more too.

Contact	Syntrillium (Pro version available from Major Music Wholesale)
Phone	(02) 9545 3540 (Pro version only)
Online	http://www.syntrillium.com/
Price	\$US69 (for Cool Edit 2000)
In short	Easy to use and a good range of features and tools.

WAVE SEQUENCERS

Acid DJ 2.0d

Unlike the other wave sequencing programs reviewed here, Acid is primarily intended for sequencing loops rather than triggering individual sounds. The other three programs focus on constructing drum patterns and melodies with individual notes, but Acid is designed for manipulating existing beats and melodies.

This doesn't mean that you can't use Acid to write beats and melodies. The difference is that Acid doesn't use patterns that are then structured into a song. Instead, you have an audio timeline similar to that found in video software like Adobe Premiere.

You have an unlimited number of tracks, and each track has its own volume and pan controls. Each segment in the timeline has its own pitch control, so you can create melodies with your samples. Any melodies or beats that you do construct manually can be mixed down to another track and used as a loop.

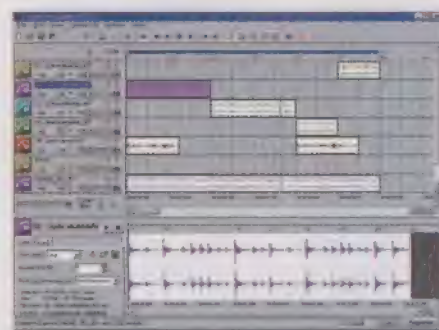
When you load a sound into Acid, it is automatically set to 'looped', so if you plan to use a lot of 'one-shot' sounds it can

be time consuming to reset all the channels. There are a couple of shareware and freeware utilities that can batch process samples to automate this task. However, you might find it quicker to do your beat and melody construction in a drum machine-style wave sequencer and use Acid for song construction and remixing.

One of the best features of Acid is its amazing real time pitch shifting. Most programs either speed up or slow down your samples in order to fit them to a particular tempo, but Acid analyses your sample and intelligently time stretches it without altering the pitch, all in real time. You can then tweak the pitch independently if you need to.

This means you can easily mix loops taken from two or more songs written in different keys and at different tempos and match them together accurately. It's the perfect remix tool.

Acid DJ is extremely straightforward to use. The lack of effects is frustrating, but upgrading to the Pro version would give you access to multiple real time DirectX effects channels. Trying to write



a song from scratch can be awkward until you build up enough loops to arrange into a song, but once you reach that stage it's almost too easy. The best thing about Acid is its combination of features — it lies somewhere between a multitrack program and a wave sequencer, taking aspects from each and adding extra features.

Contact	New Magic
Phone	(03) 9885 5888
Online	http://www.sonicfoundry.com/
Price	\$99
In short	Time stretching in real time, but no effects. Good for remixing.

d-lusion DrumStation 1.08

DrumStation has been around for a few years and hasn't changed much in that time. As the name implies, it is a virtual drum machine and no more.

You get eight tracks and 16 steps per pattern. You can create up to 32 drum patterns which can then be arranged in a sequence of up to 99 patterns to create a song. Each track has its own settings for volume, pitch, attack, decay and a choice of effects.

These can be operated in real time, but you cannot store these modifications in a song. Instead, you need to stream your song to a wave file and play the tweaking live. This restricts you to one knob at a time, as you can only use the mouse to make modifications to the parameters.

These limitations may present an unappealing picture of the program, but this is a groove creator rather than a compositional tool. It has excellent shuffle controls which allow you to carefully create a swung rhythm and it is extremely easy to use.

The drum machine patterns follow the classic Roland TR909 style where a sound

is either on, off or 'accented'. You can mute channels but not solo them. DrumStation is really geared towards being used in a live context. Its 'song' features seem so limited because it is more of a jamming tool.

Hence, you can play one pattern and edit another one at the same time. You can also trigger a drum sound manually by hitting keys on your computer keyboard, and channels can be muted in the same way. You can also select the pattern to play when the current pattern has finished.

DrumStation's focus on real time applications is also apparent in its ability to synchronise with the d-lusion Digital Audio Server (DAS). DAS is a free program that allows you to run as many d-lusion programs as you like simultaneously, in perfect sync.

For example, you could run a couple of DrumStations and maybe add the d-lusion RubberDuck virtual synth, or possibly MJ Studio (a set of virtual MP3 DJ turntables). DAS can then be used to sync all of these possible combinations to any other music software via MIDI clock. The possibilities are limited only by your CPU



and RAM. It works on the same principle as masterBEAT and its accompanying virtual synth masterSYNTH, but unlike masterBEAT it's not limited to one drum machine and one synth.

If you're looking for a wave sequencer to use live, or at least in real time, in combination with other programs or outboard MIDI equipment, then DrumStation might be the answer. None of the other wave sequencers are really up to the task.

Contact	d-lusion interactive media
Online	http://www.dlusion.com/
Price	\$US35
In short	Basic drum machine with effects suited to live use.

WAVE SEQUENCERS

FruityLoops 2.54

FruityLoops has come a long way since its humble beginnings as a virtual drum machine. The developers have introduced three 'flavours' of the program so that people can register the features they use without paying for the ones they don't. The basic version of FruityLoops is very modest, and is essentially a simple virtual drum machine. It's not until you upgrade to FruityLoops Pro that things start to get really tasty.

FruityLoops Pro supports unlimited channels with pattern lengths of 16, 32, 48 or 64 steps. You can then sequence as many patterns as you like — not just in sequential order, but simultaneously using the playlist. This is something none of the other sequencers provide.

The Pro version also provides a keyboard so you can pitch shift notes and write melodies. You have volume, pan, filter cut-off and resonance controls for each note, which can be edited graphically. On top of this, there are eight 'plug-in banks', each containing up to four VST or DirectX

plug-ins, and you can route any channel to any plug-in bank.

With the full TS-404 version of FruityLoops Pro, you get a built-in virtual synth. The TS-404 is a fully featured software synth with a very broad spectrum of sounds. The full version also includes live recording, giving you full real time control over any knob, which can be recorded live to an event list. For those fortunate enough to own MIDI instruments with their own knobs, these can be assigned to any of the knobs in FruityLoops Pro.

Each sample has its own envelopes for volume, cut-off, resonance, pitch and pan as well as an independent LFO (low frequency oscillator) for each of these parameters. There are also three custom effects and a delay for each channel.

Fruity Pro integrates support for a few other programs. It can load sound presets from SimSynth and DrumSynth, and using the engine of a program called BeatSlicer, it can import drum loops, chop them up and sequence the individual



sounds for you. You can also import old ReBirth songs.

Unlike the other programs reviewed here, FruityLoops Pro offers a built-in drum machine, virtual synth, flexible sequencing, multiple effects support — both custom and third party — all rolled into one. It can even export an MP3 when you're done. The full version is expensive, but you get a lot for the money.

Contact

FruityLoops

Online

<http://www.fruityloops.net/>

Price

\$US70 for FruityLoops Pro

In short

Great all-in-one virtual studio with synths and effects.

Masterbits masterBEAT 2.1

masterBEAT is new to the wave sequencer scene. It borrows a few things from other programs reviewed here, especially FruityLoops. At first, this product seems like a glorified version of HammerHead, one of the first wave sequencers to hit the Windows world. Essentially, it is an eight-track drum machine program that works with 16 or 32-step patterns. This means you can load up to eight samples, create drum patterns and then sequence those patterns into a song.

One feature that rescues masterBEAT from being just a drum machine is the Notes window. Here you can specify a pitch note to play a sound at, enabling you to create melodies. Being able to set volume, distortion, filter cut-off and resonance levels for each note is also good and allows for wide of variation in sound from the original sample.

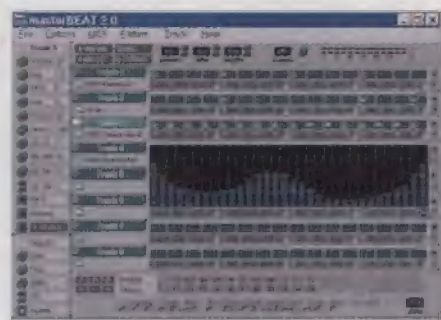
Another useful feature of masterBEAT is the ability to assign a VST plug-in effect

to each track. This allows you to use third-party plug-in, which dramatically expands the range of sounds and effects you can use.

For additional control, you can assign MIDI controllers to common controls like song tempo, volume, filter cut-off and distortion levels. You can also send and receive MIDI clock timing for synchronising with other music programs with Masterbits' masterSYNTH.

The combination of these two programs gives you a virtual drum machine and virtual synthesiser with far more versatility than a virtual synthesiser like ReBirth, and for a fraction of the price.

To produce a less mechanical rhythm, there is a flexible shuffle control, allowing for pre-delay, delay and humanisation. You can specify whether to shuffle eighth, 16th, quarter or all notes, and which tracks to apply the shuffle to. This is the



most versatile 'groove' editing APC has seen in any wave sequencer.

You can copy and paste between tracks as well as patterns. There is a randomise feature for when you need inspiration, and you can mute and solo tracks as well.

Overall, masterBEAT makes an excellent virtual drum machine. It can be used successfully for writing whole songs, but it wasn't made with this in mind. Instead, it's a great tool for constructing beats and for combining with other programs, particularly audio multitrackers.

Contact

Masterbits

Online

<http://www.masterbits.com/>

Price

\$US40

In short

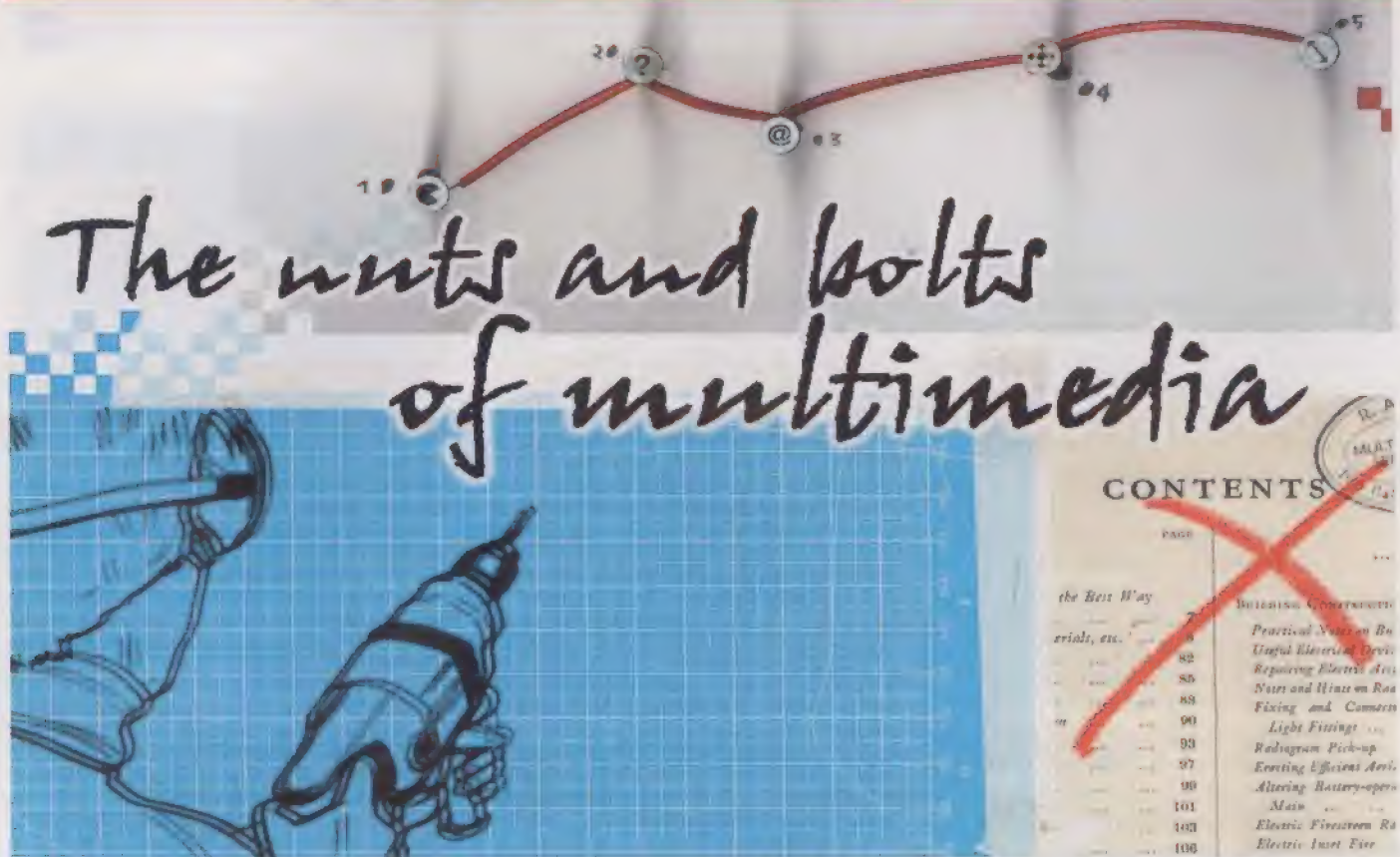
Versatile sequencer with support for plug-in effects.



Editor's Choice

Audio editors
Syntrillium
Cool Edit 2000

Wave sequencers
FruityLoops 2.54



Multimedia authoring software is the key to developing your own applications. Make your own games, build your own tutorials or use it to spruce up your Web site.

Alex Kidman sizes up the options.

Tools for the creation of multimedia presentations and applications have been around for years. Their capabilities vary considerably, but their main purpose is to build applications and integrated presentations with drag-and-drop ease. Want to create a game that allows you to escape killer incarnations of Celine Dion (see page 126)? These are the tools you need.

Multimedia has shifted from the domain of the CD-ROM to the Internet over the last decade and this presents new challenges. Multimedia creation tools have had to adapt accordingly, and they now have features which can considerably reduce the file size of created applications.

Most of the current programs minimise file size by selecting smaller embedded file formats. The best example of this is the adoption of MP3 as a sound format for multimedia documents. Most multimedia authoring packages support the importation of MP3 files. MP3 isn't just about song compression. If you take a standard WAV file and compress it to MP3 format, the size savings can be considerable. Aside from sound, size-friendly formats can also be used for graphics. Flash, for example, ren-

ders all of its shapes as vectors because they're both scalable and small.

Web exposure

Not all of the applications can generate executable files, but this isn't necessarily a problem, especially for Web-based multimedia. Executable files are generally platform dependent, but one way to sidestep the problem of platform dependence is to use specific players for content delivery.

Players perform two basic but important tasks. They act as the interface for sound, video and interactive elements, presenting the content in whatever manner is desired. They also stream content.

RealPlayer, for example, buffers a certain amount of content before it begins playing a file, so that it can finish getting the rest while it plays the already downloaded portion. This doesn't always work, of course; streamed content, especially video, is often jumpy, with sound playing while images freeze, blur and seem to take on a life of their own.

In addition to flashy presentations and animations, other specific uses for multimedia have emerged over the last decade.

The first, and most obvious, is computer-based training (CBT). Rather than using a dusty textbook, students learn from a CD-ROM with visual examples, animation and other eye-catching effects. CBT is big business, but you would need a sophisticated package such as Director or iShell for really interactive CBT creation. A practical spinoff from CBT is general education, where programs that favour simplicity over features really shine. HyperStudio (reviewed on page 113) is a good example of an education-focused package.

Multimedia doesn't always have to be serious. There are plenty of packages that focus on creating engaging multimedia distractions. Thingworld (<http://www.thingworld.com/>), for example, offers multimedia screensaver content with an entertainment twist.

The packages APC reviewed are just the tip of the iceberg. When choosing a multimedia tool, consider the specific characteristics of the project that it's for. Some handle interaction well, others focus on animation or object management. Multimedia authoring software is a rapidly expanding field, and the only limitation is individual creativity.

HyperStudio 3.1

HyperStudio is well established and focuses on education. HyperStudio projects (called 'stacks') are made up of groups of single backdrops, referred to as 'cards'. Each card can have a variety of elements placed onto it, from video footage to simple line drawings. Everything in HyperStudio — from link creation to colour choice — is menu based, which increases the time it takes to access items. To create a basic filled square, we had to use one menu to set colour, then create the square, then go back to the colour menu to change the colour for the next item.

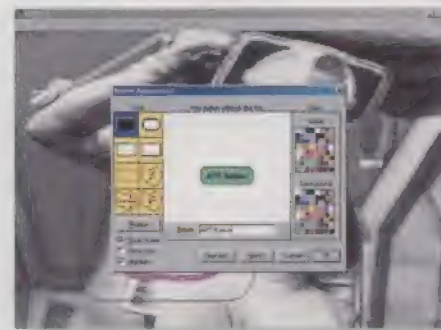
However, HyperStudio's basic operation is hard to fault — its interface is slow,

but every option is explained in great detail. It supports some complex technologies, such as remote accessing of other files and scripting (through its HyperLogo scripting language). This makes some room for newer multimedia designers to expand their skills.

If you want to dabble in multimedia, and especially if you want to involve your children, HyperStudio is just about fool-proof. However, that security comes at a price — it's not a very complex tool, especially when compared to Macromedia Director or Scala Infochannel Designer.

Contact
Phone

Scholastic New Media
(02) 4328 3555



Online

<http://www.hyperstudio.com/>

Price

\$219

In short

A good product to cut your teeth on.

IMSI Multimedia Fusion

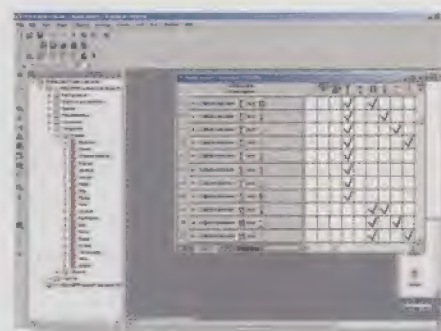
Multimedia Fusion (formerly called Klik & Play and Corel Click & Create) is best suited to creating games and screensavers. Its design interface is not easily accessible. It attempts to bypass the need for coding by assigning programmable properties to elements on a storyboard. This means you don't have to learn scripting, but you end up doing the same job anyway by assigning variables in a GUI rather than script.

APC found its window management was sloppy. The available space for windows is small, and we often had to switch between three or more stacked windows. When docking was disabled the situation became even worse, because windows tended to slide underneath each other.

Multimedia Fusion also has the worst single CD-based tutorial APC has ever encountered. It has poor narration, and often gives examples without properly showing you how the results were achieved. Oddly enough, the silent, text-based version of the tutorial was excellent.

IMSI also produces a cut-down version of Multimedia Fusion, dubbed Multimedia Fusion Express, which contains fewer interactive elements and focuses on simple design.

Multimedia Fusion is one of the more basic products that APC examined, but it is inexpensive and we recommend it for playing around with multimedia.



Contact

Hilad

Phone

(02) 9700 9377

Online

<http://www.imsi.com.au/>

Price

\$199

In short

A good basic package.

Intelamedia Dazzler Deluxe

Dazzler Deluxe uses a slightly different operating method to the rest of the packages APC looked at. Its interface is plain and the options aren't immediately evident. Elements are entered into a hierarchy, and displayed in order, based on the definitions given to them. Despite its unintuitive interface, Dazzler has considerable potential.

The usual selection of graphics, sounds, video and interactive elements are hidden in the interface, but a few individual features make Dazzler Deluxe stand out. APC was particularly impressed with the automatic question wizard which defines all the sub-tasks needed for interactive quizzes. Dazzler makes creating computer-based training applications a breeze. The

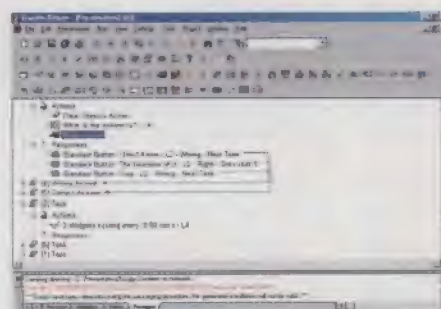
learning curve is steep for new users, but experienced programmers (rather than designers) would do well with Dazzler.

Like most of the other programs reviewed, Dazzler is capable of simple shape design, but not a great deal else. You still need to import multimedia content.

The demo version APC looked at runs everything but the final export of applications, so this feature could not be tested. The Deluxe version has the ability to store and process information. If that isn't important to you, then the basic package is considerably cheaper.

Contact
Phone

Dazzlersoft
(07) 3862 1918



Online

<http://www.dazzlersoft.com/>

Price

\$1,495

In short

A powerful tool for programmers.

Macromedia Director 8 Shockwave Studio

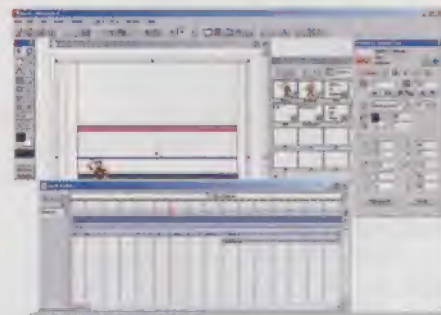
Director used to focus on CD content creation, but newer releases have emphasised the use of the Internet in content delivery, encouraging you to output to Macromedia's Shockwave player. The visual style relies on a movie paradigm: events take place on a defined stage, set against a score which paces the responses of various onscreen elements.

When you install Director, you need to increase your screen resolution or, if possible, invest in a second monitor. Director 8 has floating menus, and plenty of them. It uses a floating, context-sensitive property inspector for basic tasks, but there are many other tools you'll need to access regularly. The main stage can be

resized to save some space, but it is practically unworkable at anything less than 1,024 by 768.

In keeping with the idea of Director 8 Shockwave Studio as a complete production environment, the package includes Macromedia's Fireworks 3 (see APC February, page 34) and Sonic Foundry's Sound Forge XP (see review on page 109). A copy of Shockwave server is also included to help you to create and launch Shockwave content.

Director's manual has a reasonable tutorial to take you through creating a basic Shockwave animation, but the learning curve is still steep, especially once you start fiddling with Lingo, Director's scripting language.



Contact	Macromedia
Phone	(03) 9853 0900
Online	http://macromedia.com/
Price	\$1,895
In short	A powerful and extremely flexible authoring tool.

Macromedia Flash 4/FreeHand 9 Studio

Flash is easy to use and is preinstalled in most new browsers. Flash 4 (see review in APC August 1999, page 36), is now bundled with its illustration tool, FreeHand.

Flash is particularly appealing if you want some of the features of Director without the complexity. Both products' latest releases look similar, but Flash's screen layout is a little easier to work with. This is due to the smaller number of controls and the automatic toolbar locking feature (which Director lacks).

Content creation with Flash is geared towards simple animation, but it's not too difficult to go beyond cartoon-style animations. The tutorial supplied is reasonably basic; it walks you through simple

image manipulation and animation, but not much else.

Flash focuses on Web-based content delivery and benefits from its compatibility with a wide range of browsers.

The inclusion of FreeHand makes for an appealing multimedia studio. Vector graphics can be created and modified quickly in Freehand, then imported wholesale into Flash for eventual animation. The advantage of this vector approach is that vectors are infinitely scalable. Their file size is small and they are easy to adjust in either package.



Online	http://macromedia.com/
Price	\$899
In short	This appealing multimedia studio is packed with features.

Scala Infochannel Designer

Infochannel Designer lacks the standard toolbars and multiple screens of most Windows software. Instead, it works through a single, menu-driven interface and menu choices are presented as simple text options. It doesn't have a timeline for projects, relying instead on a storyboard motif for layout.

Although the interface is unusual, Infochannel Designer is exceptionally easy to use. As with Director and Flash, the emphasis is on content delivery via the Web, in this case using Scala's proprietary iPlay media player, which is included with the package. iPlay is nowhere near as widespread as Flash or Shockwave, but it certainly matches them in the range of options it provides.

Infochannel Designer is aimed at graphic designers who don't have the inclination to learn complex scripting software.

Like video editing products, it has a mass of exceptional transition effects. These can be applied when placing elements onscreen and when switching from page to page in storyboard mode, using everything from simple fades to complex effects.

APC found Infochannel Designer was very slow when browsing for content to add to pages.



Price	\$1,495
In short	A powerful multimedia authoring package with a strong graphical slant that would appeal to designers.

Contact	NewMagic
Phone	(03) 9885 5888
Online	http://www.newmagic.com.au/

Swish 1.0

Swish sits halfway between being an add-on for Macromedia's Flash and a standalone product. It allows you to create Flash-type text animations without Flash. Files are saved in Flash's SWF format, and can be imported into Flash.

Swish exists primarily because Macromedia has made SWF an open format in an attempt to make it a standard and according to Macromedia, about 80% of installed browsers are Flash compliant.

Swish's interface couldn't be much simpler: a menu window controls your actions while a preview window allows you to watch your animations.

Text animations are defined by scenes, each with its own internal timeline; just



drop text frames into a timeline, pick an animation type, break the animation settings and save your files. Swish supports publishing full HTML files to run your text animations, which is also handy

if you need suitable code to insert into an existing HTML document.

Although Swish only handles text animations, its ability to export files into Flash makes it a valuable tool. It is much easier to create text effects using the Swish interface than Flash.

Swish is an Australian product and good value at \$US30.

Contact	DJ Holdings
Phone	N/A
Online	http://www.swishzone.com/
Price	\$US30
In short	A fine HTML tool, especially for Flash fanatics.

Tribeworks iShell 1.2

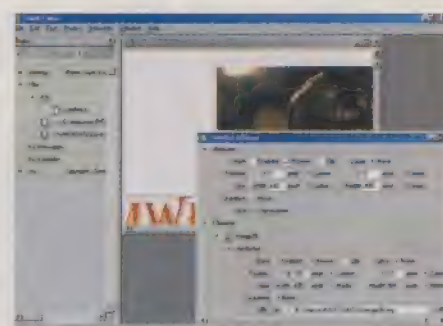
Tribeworks iShell is free for non-commercial use, but applications you create with it carry a Tribeworks splash screen, and the option to remove it comes only with a paid 'membership'. If you pay for the product, you also receive technical and developer support, along with source code and SDK access.

iShell's interface looks similar to Dazler's, but it's more complicated. Element properties are simple to set by choosing from the relevant list, but interaction between elements can be extremely complicated and distinctly non-hierarchical. This gives quite a bit of power to developers, but it can be difficult to interpret finished projects, especially if you're not the person who originally wrote them.

One of iShell's strengths is its ability to use QuickTime files, but you can also create CDs and downloadable programs. QuickTime 3 is a required component of iShell — it's used to manipulate all onscreen elements — but there is no option within iShell to export QuickTime files. However, the files created are flexible and just as interactive as their QuickTime counterparts.

The first year's subscription is roughly equivalent to the price of other high-end packages, but it's unclear what happens if your 'membership' lapses.

Contact	Tribeworks
Phone	N/A
Online	http://www.tribeworks.com/



Price	Free for non-commercial use, \$US2,000 a year for full 'membership'
In short	A quick way to create multimedia applications.

Editor's Choice



Macromedia Director 8 Shockwave Studio

Highly commended Tribeworks iShell

Director 8 gives a great deal of power to multimedia authors. It supports both Mac and Windows formats, and the inclusion of Fireworks for image optimisation and Sound Forge for sound work is the icing on the cake.

iShell provides great creative freedom, but the subscription-based pricing model is a concern.

How we tested

As multimedia can mean many things, APC assessed each package in terms of its features, rather than measuring it against particular requirements. To test how easy a package was to pick up and how quickly rote tasks might be completed, APC attempted to set up an individual multimedia presentation based around a few simple graphics, a sound file and an interactive button to move to a secondary page. We focused on the following features.

- **File type support** Whether the software supports graphics, sound, video and interactivity, and if so,

which file formats and to what level of customisation.

- **Ease of use** Whether the software is accessible to multimedia beginners, and whether it has the complexity to cater for fully-fledged developers.
- **Animation** Whether creating animation was straightforward or laborious.
- **Interactivity** Whether interactive elements were easy to set up, and what options were presented to creators.
- **End output** Whether the software supports CD-ROM authoring, Web streaming, individual applications or player-specific modules.

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1980



2000

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ACP
Tech

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Workshop

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Something buggy in Workshop

It seems that Workshop has been neglecting some of its most dedicated readers lately. There's been something of a communication breakdown at the APC offices and some of our bug of the month winners are yet to receive their prizes. There's no one to blame for this but yours truly; I apologise and I've taken steps to remedy the situation.

This month's bug of the month reveals that Telstra Big Pond's email service has developed a fairly serious glitch of its own (see below). APC tested the bug and found that our earnest bug hunter's complaint is accurate. If you have had any experience with this worrying bug, please let Workshop know.

To ensure your Workshop experience is as hands-on as possible, drop the APC cover CD into your CD-ROM drive and check out the Workshop section. It contains all the sample files mentioned throughout Workshop as well as a selection of shareware that's been tested and reviewed by APC experts. You'll find a

summary of this shareware alongside each OS column.

While you're browsing the CD, you'll come across an enormous range of the latest shareware and freeware, freshly plucked from the Web by APC's CD team. For a complete listing of CD contents, turn to page 8.

Andrew Colley, Workshop coordinator

Workshop is a reader-input section. Please send your ideas, comments or criticisms to workshop@acptech.net, or to our snail mail address APC Workshop, PO Box 4088, Sydney NSW 1028. Alternatively, you can join one of the online discussion forums at apcmag.com to raise technical issues with fellow DIY enthusiasts or voice your opinion on any topic featured in Workshop. A full archive of Workshop articles can be found at <http://apcmag.com/workshop/>.

Bug of the month

Most of the bugs featured in 'Bug of the month' are cute or funny, but this month's report from Simon Morris is a little on the scary side. Let's say that I register a domain botm.com.au, and have it hosted by Big Pond Internet Services. Let's say our long-suffering Workshop coordinator, Andrew Colley, sends me an email at michael@botm.com.au. If that email address doesn't exist, the email will be delivered to michael@bigpond.com instead (if that one does exist), even though the two Michaels are completely different people.

If Andrew included APC trade secrets, or details of his scandalous affair with Nicole Kidman in his message, he'd be rather upset to find his email in the hands of a stranger. According to Simon, Telstra considers this a feature, not a bug. Personally, I won't be awarding Simon the Feature of the month award!

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, features that function poorly, or things that crash a particular application. Anything and everything buggy deserves mention.

Send us your favourite bug via email to bugs@acptech.net or snail mail to APC Bug of the month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a one-year subscription to APC. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

The winner's name, along with details of the bug, will appear in this column in APC August. So start hunting!
Michael Smith

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This month in Workshop

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Technobabble revisits the topic of computer memory to see what kinds are available and how they perform. **By Alex Kidman**

Technobabble

In May, Technobabble started looking at computer memory — if you haven't read that article you might want to go back and read it now (at <http://apcmag.com/babble/>). This month, we'll focus on physical memory types and how they relate to speed and efficiency.

Memory is big business — in the 1999 calendar year, the market was worth \$US20 billion worldwide. Memory isn't cheap at the moment. A Dell PC we looked at last month (see APC June, page 36) uses a type of memory that costs about \$800 for 128M. With that much money at stake, it's important to know what you need, and exactly what you're getting.

The basics

Memory comes in modules that slot into motherboard sockets, called memory sockets. The type of memory you will need varies according to the age of your system — do you need SIMMS? DIMMS? SDRAM? RDRAM?

You often hear memory modules referred in terms of 30-pin, 72-pin or 168-pin. The pin width is a size rating to cover the potential memory bandwidth. Older systems need 30-pin SIMMs (which are almost impossible to find now), while newer systems use 72 or 168-pin modules.

SIMMs and DIMMs

Single inline memory module (SIMM) technology is now quite old and you would have a lot of trouble tracking down SIMMs, unless you frequent secondhand dealers. SIMMs were built into both 30 and 72-pin modules with the 30-pin modules maxing out at 4M. Access times are slow and generally the modules are quite small, ranging from 1M to 16M.

Dual inline memory modules (DIMMs) have come onto the scene in the last five years or so. DIMMs are 168-pin modules, and deliver 64 bits of data per access.

Once you work out your memory type, you need to check that your memory speed is supported by your motherboard.

The right speed

Memory hasn't even come close to keeping up with increases in processor speed.



You may have a nifty 1GHz CPU in your system, but your memory probably runs at just 133MHz. Often the processor sits through several wait cycles while memory is accessed, but recent improvements in memory fabrication have reduced the wait time.

Memory is limited by the speed at which it can throw data down the memory bus, and is rated accordingly. For instance, a description of a current memory type might list its bandwidth as 3.2G per second.

In the past, memory was rated by the minimum number of nanoseconds (ns) taken for data access. Memory has no moving parts, so its access times are consistent (presuming you don't have faulty memory). Older systems use memory ranging from 70 to 100ns access times, while newer memory runs as fast as 7ns (the lower the access time, the better).

Ultimately, having the fastest memory doesn't mean much if the output of the memory exceeds the data capacity of the system bus. This is why recently released memory is frequently rated by its bus capacity.

Buses

Buses will be covered in some detail in a future Technobabble, but for now we'll look at the specific bus that relates to memory: the memory or system bus.

A bus is simply a data path in a computer system. Rather like a physical bus,

data travels along a predetermined route, picking up 'passengers' (in this case, data) and carrying it back to the CPU for processing.

The memory bus controls the flow of data to and from the memory. As with most buses, it is split into address and data buses. The address bus is fairly simple — it controls the addressing of data. When a memory access is attempted, the address bus carries information regarding the precise location of that data in memory. The data bus is the pathway for that data to travel along, and is usually measured in terms of bandwidth (the number of bits that can travel along it at any one time). Most motherboards have memory buses that are 64 bits wide, but older systems may only have a bus 32 bits wide.

The total bandwidth of the bus is its width multiplied by its clock speed. Technically, a 64-bit bus running at 100MHz can transfer 6,400,000,000 bits per second (or 6.4Gbps). Memory rarely achieves this speed for a variety of reasons; access speed is one of them.

Memory access

The specific technology that memory uses also affects memory access speed. You might hear memory being referred to as FPM, EDO, SDRAM or RDRAM. These relate to the access method and the speed at which the memory can be read by the system.

Older systems use what is known as asynchronous memory, meaning that it isn't synchronised with the main processor. Asynchronous memory bursts out whatever it can, whenever it can. Being out of step with the processor isn't too much of a problem if the memory is faster than the processor, but that isn't normally the case.

As the name suggests, synchronous memory works at the clock speed of the system — or an even multiple or fraction thereof — so that memory access is regulated and runs near peak capacity. Asynchronous RAM usually peaks at 60ns access times, whereas synchronous RAM has access times as low as 6 or 7ns.

When the system needs data from memory, a request is sent and memory is retrieved by accessing unique memory locations. Mainly for reasons of cost, memory is arranged in pigeonhole fashion, with each memory address referenced via rows and columns, rather like playing battleships. A request is sent to first find the relevant row, then the column for the data bit. This is substantially faster than sequential access, where you have to pass every part of data before your required variable. Very basic dynamic RAM uses only a simple call to rows and columns, but there have been several technological advances that improve upon that model.

EDO and FPM (see 'Memory types' at right) are asynchronous technologies, and generally feature slower accesses than synchronous RAM — but not much slower. The memory access latency comes from the access to the first

requested memory location. Most memory accesses will span more than one single address, and once the initial trip is made, further trips to nearby locations can be made quickly. This type of access is commonly described as 'burst' access, mainly because once the initial data is sent, the rest can be sent in larger bursts.

It can take from five to 10 clock cycles for the initial access to be made. Because synchronised RAM runs at clock speed, its real advantage becomes apparent when those subsequent accesses are made. It may take 10 cycles for the first access, but

each subsequent access can hit at a single clock cycle. Depending on the system chipset your motherboard supports, EDO RAM may have a faster initial access time, but subsequent accesses will tend to be slower.

Next month, Technobabble begins a series on storage devices and media. The first part explores the humble floppy drive.

Alex Kidman can be contacted at alexk@acptech.net. For a complete archive of APC Technobabble columns, see <http://apcmag.com/babble/>.

Memory types

Fast page mode RAM (FPM RAM)

works by sending out a single row address for memory locations near each other. This speeds continuous memory addressing, as a separate row call isn't required for each memory location. FPM RAM runs on buses of up to 66MHz.

Extended data out RAM (EDO RAM)

timing allows for one memory access to begin before the previous one has finished. This increases speed by about 5% beyond FPM RAM, but it is still not being synchronised with the system clock, where much larger gains can be made. EDO RAM typically runs with systems with a bus speed of up to 75MHz. If you're using asynchronous RAM that's less than four years old, it's probably EDO RAM.

Synchronous dynamic RAM (SDRAM) can run at higher bus speeds.

Many old systems use a bus speed of only 66MHz, which limits memory access speed. Newer systems use bus speeds of 100 or 133MHz, and almost exclusively support SDRAM.

Double data rate SDRAM (DDR SDRAM)

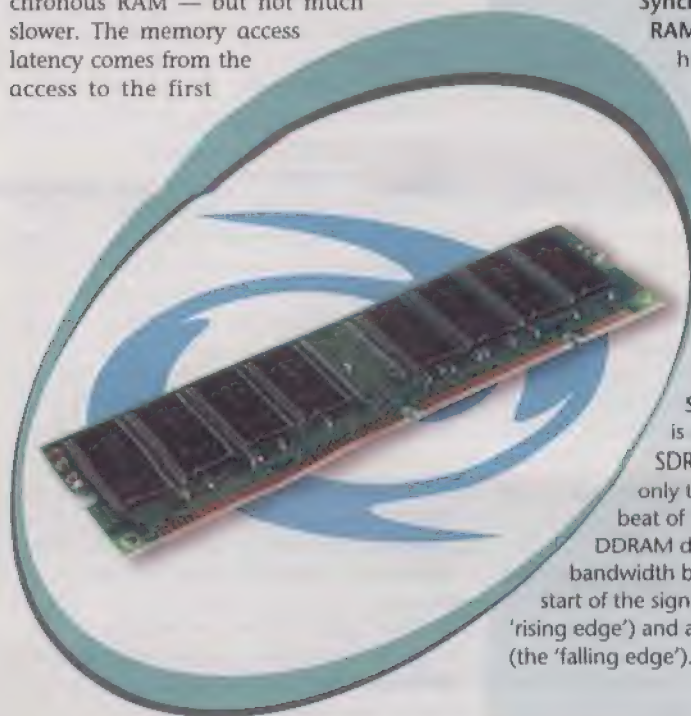
is an advanced version of SDRAM. Normal SDRAM only transfers on the initial beat of each clock cycle, but DDRAM doubles the effective bandwidth by transferring at the start of the signal (referred to as the 'rising edge') and at the end of that signal (the 'falling edge').

Until now, DDR SDRAM (which is still very expensive) has been mainly used for high-end graphics, where the data rate is of paramount importance. On the cutting edge of SDRAM is the proposed DDR II specification, which calls for a minimum bandwidth of 400M per pin, to compete directly with the other emerging technology, Rambus RAM (RDRAM). The specification for DDR II is yet to be finalised, and implementations of DDR II SDRAM are still a year or two away.

Rambus RAM (RDRAM) is also a new technology and something of a hot potato at the moment. Intel has decided to use Rambus for most of its upcoming chipsets, despite the fact that RDRAM is still expensive, and its benefits over SDRAM aren't all that great (by some benchmarks, there may be none at all).

Where conventional memory uses a 64-bit wide bus to transfer memory contents, RDRAM only uses a 16-bit channel. This may seem strange — why go for less bandwidth? The answer lies in the fact that RDRAM works on its own data pathway (the Rambus Channel) that runs at a blistering 800MHz, providing Rambus memory with a theoretically high throughput. It uses its own packages, known as RIMMs, and you'll need a motherboard that supports RIMMs in order to use RDRAM.

If RDRAM is so good, why isn't everyone using it? The main reason is that it's very expensive. RDRAM is a closed standard, and in order to use it, memory manufacturers need to pay a royalty. Rambus has some keen competition from the existing memory producers, and while Intel (and even Nintendo and Sony) are using Rambus, SDRAM still has a strong hold on the market.



Benchmark results are not always what they seem. **By Nathan Taylor**

Core

Performance evaluations can be the most deceptive of all marketing techniques. It is essential to understand them to make any sense of the performance claims made by hardware manufacturers. A case in point: Apple caused a ruckus over its performance claims for the 233MHz G3 processor used in the original iMac. According to Apple, the processor was 40% faster than a 400MHz Pentium II. It based this figure on the results of ByteMark tests — an obscure benchmark developed in the early 90s. However, Apple's conclusion that the iMac was a faster computer than a Windows PC proved to be questionable.

Journalists at Ziff-Davis quickly produced test results that showed that the G3 was *not* as fast as an Intel under many circumstances. It ran a set of application benchmarks which showed that a 400MHz Pentium II running Windows 98 was considerably faster than an iMac. Ziff-Davis also ran ByteMark to verify the results, and found that a 333MHz Celeron was about 50% faster than the iMac. So where did Apple's figures come from? As it turns out, Apple flagrantly cheated: it used a highly optimised compiler to create the benchmark for the iMac, while using an archaic 486 compiler for the PC. Ziff-Davis, on the other hand, used the optimised compiler for the iMac, but also used a recent Pentium/Pentium II compiler for the PC.

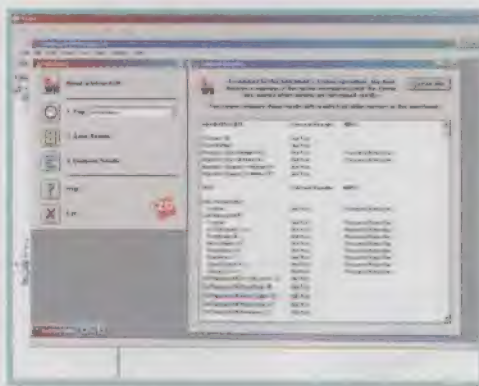
The moral of the story is that benchmark results should always be taken with a grain of salt. Even benchmarks run by independent organisations (as magazines should be) are not definitive, because no benchmark tells the whole story. The most appropriate way to use them is as an indication of overall system speed, and that is how benchmark results are applied in APC.

Understanding the limitations of benchmarks is very important. Ultimately, it comes down to a benchmark's quality and balance. Certain benchmarks play to the specifications of particular processors and system configurations. Hardware manufacturers have even gone so far as to integrate benchmarks into design strategies, focusing more on achieving good benchmark results than on practical applications.

Synthetic and 'real world' benchmarks

Benchmark software generally falls into two broad categories. The first is the *synthetic* benchmark, which puts a system through a set of artificial routines in order to profile its performance capacity. ByteMark falls into this category, as do most SPEC benchmarks and the majority of WinBench components.

The other benchmarking category, *scripted benchmarks*, is considered a closer match to everyday conditions. Scripted benchmarks open commercial applications, such as office suites or games, and run a predetermined set of actions to simulate the kind of activities computers are normally used for. The system that completes the script first wins. Programs like Winstone, SYsmark and game frame rate tests fall into this category.



Ziff-Davis's WinBench

Benchmarking purists often claim that using scripted benchmarks is the only proper way to evaluate systems because they mimic real world conditions. Others argue that synthetic benchmarks work better, because they test the *potential* of a system rather than how well it runs applications that may be several years old. Some vendors have been taking a hybrid approach, combining scripted benchmarks with synthetic routines to produce a total score.

Benchmarking organisations

There are many organisations that produce computer benchmarks, but the most significant are the Standard Performance Evaluation Corporation (SPEC), Ziff-Davis

Benchmark Operations (ZDBOp) and the Business Application Performance Corporation (BAPCo). SPEC and BAPCo are industry organisations, with a membership comprising groups of interested companies from around the world. ZDBOp is a subdivision of Ziff-Davis, which publishes a large number of computer magazines in the US and licenses material internationally.

Other notable developers include MadOnion.com, a new company responsible for several graphics benchmarks, and the Transaction Processing Performance Council (TPC), another industry consortium which develops benchmarks for determining transaction capacity.

Game and other benchmarks

Some common benchmarks appear on the next page. Of course, benchmarking isn't restricted to these products. There are more benchmarks than you can poke a stick at on the Web. Many are application specific: there are benchmarks to test how good your computer is at encryption cracking, for instance, or how fast it can compile using GCC.

Frame rate benchmarks have become very common. These tests run through a recorded script as quickly as the system can handle, and report the average frame rate achieved.

There are many CPU performance characterisation tests. ByteMark is a rather old benchmark developed by *Byte* magazine for testing processor speeds. Dhrystones and Whetstones are archaic processor benchmarks, which are now rarely quoted. A number of applications can give you Dhrystone and Whetstone scores, but they're more or less meaningless for modern processors.

These are just a few of the benchmarks available. You could also try Indy3D for 3D graphics or some of the Benchmark Factory products. Indeed, there are enough benchmarks around for manufacturers to find one that makes just about any product look good. Or they could just write one themselves, as Adaptec did with ThreadMark.

Nathan Taylor can be contacted at ntaylor@acptech.net. For a complete archive of APC Core columns, see <http://apcmag.com/core/>.

PC benchmark guide

ZDBOp

Winstone 99 is the cornerstone of Ziff-Davis' family of benchmarks. It runs scripts on common desktop applications and times their execution. It has recently been broken up into several separate benchmarks. The first, **Business Winstone 99**, runs through scripts on the major office suites and weights the score based on market share. **High-End Winstone 99** runs only on Windows NT and Windows 2000, and targets performance-critical applications such as photo, video and audio editing, compiling, and CAD. The newest product in the family, **Content Creation Winstone 2000**, focuses on applications for creating multimedia and Web content.

The scores are normalised to the performance of a control system at ZDBOp, which has a rating of 10.0. This system is a 233MHz Pentium MMX PC, with 32M of RAM and a Matrox Millennium II graphics card. If a PC scored 20, for instance, this means it ran twice as fast as the control system.

WinBench 99 is a companion suite to Winstone, designed to isolate specific computer subsystems. The graphics and disk components are primarily profiles of the Winstone 99 benchmark, replicating the exact graphics and disk calls of this test without executing the rest of the application. Consequently, there are Business and High-End versions of both. Graphics WinBench also performs video playback tests.

The WinBench 99 suite also features applications for isolating CPU speed (CPUmark 99 and FPU WinMark 99, which test integer and floating point performance respectively), CD-ROM speed (CD WinBench), audio capabilities and CPU utilisation (Audio WinBench 99), and the battery life of notebook computers (BatteryMark 3.0).

Finally, there's **3D WinBench 2000** which measures the capabilities of a PC's 3D graphics subsystem. It combines synthetic tests such as checking whether a card filters properly with scripted rendering tests. As the newest version uses the DirectX 7.0 engine and media layer, it supports transform and lighting.

WebBench 3.0 and **i-Bench 1.02** are the latest versions of Ziff-Davis' Net product testing suite. The former tests a

Web server's capacity by using client systems to generate hits on the server. **i-Bench** tests a client's Net capabilities — network speed, protocol support, plug-in support and rendering speed.

ServerBench 4.1 and **NetBench 6.0** are designed to test a server's application and file sharing capabilities, respectively. Like WebBench, they use client systems to thrash a server.

BAPCo

SYSmark 2000 is the main competitor to Winstone. Like Winstone, it runs through scripts on common applications, rating the execution time. It breaks the applications into two areas: office productivity and Internet content creation. The former runs applications such as Word, Netscape Navigator and Dragon NaturallySpeaking. Internet content creation includes products such as Bryce, Photoshop and Premiere. **SYSmark 2000** spits out a single aggregate score for both parts of the benchmark, as well as individual scores. Again, like Winstone, the score is normalised to a base system, in this case a 450MHz Pentium III with 128M of RAM and a TNT2 graphics card. The base system's score is set to 100 (as opposed to 10 in Winstone).

SYSmark 98 for Battery Life works like Ziff-Davis' BatteryMark. It keeps a notebook active in order to test its battery life under heavy work conditions.

SYSmark J ver 1.0 is a Java benchmark, designed to test the performance of Java virtual machines.

SYSmark for File Servers uses client systems to test the capacity of file servers. It is the BAPCo equivalent of NetBench.

MadOnion.com

3DMark2000 is the successor to 3DMark99 Max. It runs in a similar fashion to 3D WinBench 2000, combining synthetic tests with game scripts. It uses the DirectX 7.0 media layer, but differences between the geometry engines of 3DMark2000 and WinBench mean they frequently produce contradicting scores.

Video2000 is a new program that evaluates a system's ability to play back video. It scores on frame rates, hardware capabilities and image quality.

SPEC and TPC

SPEC CPU2000, the latest version of SPEC's best-known product, is a synthetic

benchmark designed to test processor speed. It produces four main results. The first two are **SPECint2000** and **SPECfp2000**, which are performance scores for integer operations and floating point operations respectively. The other pair of results, **SPECint rate2000** and **SPECfp rate2000** provide figures on the instruction throughput of the processor. **SPEC CPU** results are the most common means of comparing processor speeds, but few PC manufacturers have used the 2000 version of the benchmark. Most published results are for **SPEC CPU95**. It's a well-respected benchmark, but it needs some expertise to run because it requires compilation before execution.

SPECviewperf 6.1.1 is a 3D graphics benchmark based on the OpenGL API. It uses a profile of the OpenGL calls made by commercial CAD and design applications. It runs through these calls, and produces a score based on execution time. Each different application produces its own profile, called a viewset, and there is no aggregate score. **SPECviewperf** normally comes with a set of six viewsets, but other viewsets for different applications can be downloaded. Most of the default viewsets require more geometry than rendering power, so **viewperf** is a better CPU or geometry processor benchmark than rendering benchmark.

SPECglperf 3.1.2 tests similar performance vectors to **viewperf**, but is more synthetic. It's designed to test a system's maximum OpenGL performance, by running routines that repeatedly draw an object at the highest speed.

SPECapc was developed for specific application performance characterisation. It's a suite of benchmarks; each runs scripts on an individual application and produces results based on execution time. At this stage, all the applications are for industrial design.

SPECchpc96 is used to determine the capabilities of high-performance industrial systems (such as those once known as minicomputers or even mainframes).

SPEC JVM98 tests Java virtual machines.

TPC benchmarks are many and varied. **TPC's** applications all revolve around characterising a system's ability to retire transactions (*small, frequent operations*), so they're mostly relevant to servers. The most commonly quoted is **TPC-C**, a transaction throughput measure that provides a transaction per minute score. Like many of the SPEC benchmarks, you have to compile TPC programs yourself.

A bunch of books for people who are planning to set up an online business or are concerned about how to protect one.

Net profits and online risks

The Neatest Little Guide to . . . Making Money Online

The Neatest Little Guide to . . . Making Money Online claims to be a practical, step-by-step guide to setting up an online business. Unfortunately, it falls short of its objective.

One problem is that the author, Jason Kelly, does not define his target audience at the outset. Initially, he assumes the average reader will have no knowledge of personal computing, and spends a chapter explaining the difference between an Apple Mac

interviews. "Producers turn to just about anyone for comment," it states. It goes on to suggest that by sending a postcard with a handwritten note to producers every six months, you'll become a trusted source.

APC advises you to give this book a miss and put \$19.95 towards one of the following two titles reviewed here.

Cathie Kennedy

Author	Jason Kelly
Publisher	Nicholas Brealey Publishing
Contact	Allen & Unwin
Phone	(02) 8425 0100
Price	\$19.95
ISBN	1-85788-266-0
Rating	★★



and a PC, the advantages and disadvantages of purchasing through a computer shop compared with mail order and the Internet, and how to choose software such as a Web browser and mail program.

Surprisingly, the book then goes on to suggest that the Web is a great place for selling computer and Internet-related services, or even your own software. This seems a little ambitious for those who haven't purchased a PC yet.

The book is promoted as "a fully internationalised edition", but much of the information is UK specific, and would not be relevant to Australian readers (for example, the lengthy and very personal exposé on the difficulties of becoming a credit card merchant).

Advice is often grossly oversimplified. For instance, the book suggests that to secure media coverage you simply establish yourself as an expert on a topic and you'll be contacted for television and radio

Starting an Online Business for Dummies

The Dummies series, published by IDG Books Worldwide, has been phenomenally successful. At last count it boasted over 50 million copies in print. As the title suggests, the books are simple, beginner's guides to the topic at hand, and this addition is no exception.

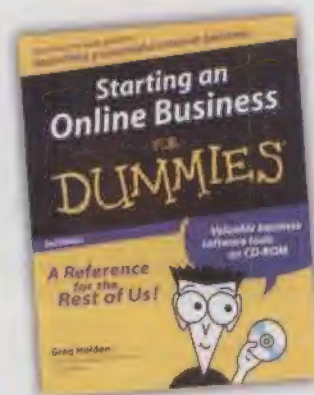
Unlike *Making Money Online*, *Starting an Online Business for Dummies* (second edition) assumes readers are familiar with the Internet, and may have experimented with their own personal home page.

Author Greg Holden covers all bases, from preparing a business plan and purchasing hardware and software, through to developing and marketing your Web site. He also discusses security and legal issues, trademark and international trade considerations, and accounting basics. As the emphasis is on breadth rather than depth, some important topics are glossed over — such as creating a business plan. Readers may need to supplement these areas with additional reading. Books such as *E-Commerce Handbook* will fill in the gaps.

The accompanying CD-ROM claims to contain demonstration and trial programs including graphics, Web page creation, accounting and client contact software. The CD in APC's review book was damaged, so we were unable to test it out.

In line with the standard layout of the Dummies series, useful icons appear in the left-hand column of the pages, indicating when an item is included on the CD or the presence of helpful tips, warnings, case studies and reminders.

A 30-page Internet directory at the end of the book provides an extensive list of Web references, but it isn't as useful as it first appears, because many of the links are to US-specific information and resources.



As a general introduction, *Starting an Online Business for Dummies* hits the mark. It won't be all things to all people, but at \$39.95, it's a worthy buy.

Cathie Kennedy

Author	Greg Holden
Publisher	IDG Books
Contact	Woodslane
Phone	(02) 9970 5111
Price	\$39.95
ISBN	0-7645-0688-9
Rating	★★★☆

E-Commerce Handbook

This is an excellent introduction to developing an ecommerce site. Unlike *Making Money Online*, it assumes that Australian small and medium-sized businesses and entrepreneurs are serious about their approach, and want to develop more than a site to sell ceramic thimbles.

Author Tim O'Brien outlines a strategic approach and recommends planning in seven key areas: management, IT infra-

structure, design, content, ecommerce payment systems, marketing and customer service.

Unlike the previous two titles, which suggest you can build a Web site for a few hundred dollars, the *E-Commerce Handbook* assumes entry-level costs of \$15,000 to \$20,000, which is a more realistic figure for a basic Web site with online ordering and payment functions. It advises readers to set an annual maintenance budget of between 50% and 100% of the initial investment. Both the previous books overlook the additional but necessary cost of developing a Web site.

The book is written and published in Melbourne, so most case studies, information and statistics are Australia based. Any overseas material is put into a local context. The handbook is jam-packed with practical advice such as how to calculate the traffic you'll need for your site to generate the required business. It details useful resources like Australia Post's Sprintpak



order fulfilment service aimed specifically at Web merchants. It also includes links to sites for further information, as well as checklists at the end of each chapter.

Screenshots help to reinforce and illustrate key messages. Unlike many books, they are reproduced at a size you can actually read.

If you're a small to medium-sized business owner looking for a practical book on developing an ecommerce strategy that's based on a sound theoretical framework, then look no further than the *E-Commerce Handbook*.

Cathie Kennedy

Author Tim O'Brien
Publisher Tri-Obi Productions
Contact Web Strategy Resources
Phone (03) 9614 3002
Price \$24.95
ISBN 0-646-39013-9
Rating ★★★★★

Hacking Exposed

Protection against hackers (or crackers, as they're known to the cognoscenti) relies mainly on defending networks against intrusion. *Hacking Exposed: Network Security Secrets and Solutions* is a primer on hacking and hacking techniques, written for those with a reasonable knowledge of computer networks and their systems.

However, the book is reasonably accessible to people less technically adept.

The authors, all experts in the setting up, operation and defence of networks, have structured the book so that it's easy to pick up and just read. If, for example, you're interested in denial of service (DOS) attacks (and who wouldn't be after the recent attacks on eBay and others), then it's simply a matter of skipping to the chapter on DOS and following it through.

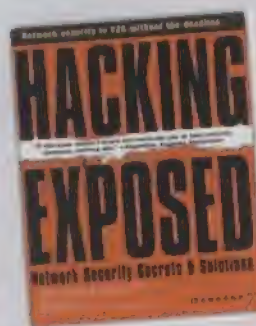
Representative of other chapters in the book, this one starts with a brief explanation of what DOS attacks are and the possible motivations of the DOS hacker. It then runs through the different types of DOS attacks, explaining how the attacks are launched and the technical vulnerabilities within the network infrastructure that the hacker can exploit.

The chapter also explains, at a granular level, the differences in DOS attacks on Unix operating systems and NT, using code examples and diagrams. Most chapters also include a short case study outlining the attack, its results and the defences subsequently put in place.

This book is an admirable attempt at encapsulating all aspects of hacking in one volume.

Josh Gliddon

Authors Stuart McClure, Joel Scambray, George Kurtz
Publisher Osborne/McGraw-Hill
Contact McGraw-Hill
Phone (02) 9415 9888
Price \$64.95
ISBN 0-07-212127-0
Rating ★★★★★



Defending Your Digital Assets

This weighty tome, *Defending Your Digital Assets Against Hackers, Crackers, Spies and Thieves* is published by an arm of data security company RSA, and goes into far greater depth about hackers, crackers and other digital spies and their motivations than *Hacking Exposed*.

It also has more details about precautions businesses should use to defend digital assets against espionage, whether it's commercial or simply malicious.

Where it differs from other books on hacking is in its overview of laws pertaining to digital espionage, as well as its in-depth treatment of

encryption and the use of biometrics as defence measures.

The section on legislation avoids the trap that many of these books falls into: an excessive emphasis on the US with little or no consideration of the laws in other jurisdictions. There is a chapter devoted to the US, but a subsequent section deals with experiences in other countries relating to digital signature legislation and the need for a common intra-jurisdictional legal framework.

Biometrics is also given

comprehensive treatment.

There is an overview of biometric techniques and the positive aspects of using biometrics as an advanced security measure.

This comprehensive text is aimed at people who really need to know what the potential threats to their digital assets are, and how they can defend themselves

against them. In this regard,

Defending Your Digital Assets is spot on.

Josh Gliddon

Authors Randall Nichols, Daniel J Ryan, Julie Ryan
Publisher McGraw Hill
Contact McGraw Hill
Phone (02) 9415 9888
Price \$79.95
ISBN 0-07-212285-4
Rating ★★★★★



Get the most out of your Internet connection with just a little tweaking. By Daniel Rutter

Step by Step

Whether you have a modem or a broadband Internet connection, chances are you can improve its performance. Here are a few pointers.

There are two speed measures for Internet connections: bandwidth and latency. Bandwidth is how much data you can send in a given period of time; latency is how long you have to wait before whatever you're communicating with hears you and sends a message back. Lots of bandwidth, which is what you get from a broadband connection, will give you faster Web surfing and downloads. Very low latency, which you also get from most broadband connections, is only handy for those who want to play online action games.

Modem tweaking

Not all modems are alike. The main factor distinguishing them is whether they're hardware or software based (or host-based).

All normal external serial modems — the separate boxes that most people think of when you say 'modem' — are hardware modems. They do all of the modulation and demodulation work themselves, and the computer just sends and receives data through the serial port. They work with any computer that has a standard serial port.

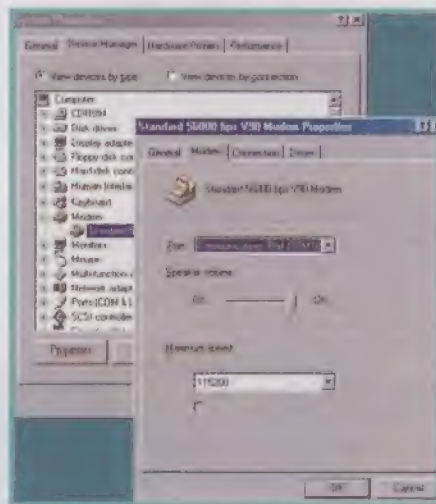
On the other hand, all of the current crop of cheap internal modems (and a few external USB ones), are host based — they use the computer's CPU to do the grunt work, instead of having their own onboard hardware. This means most of them only work with Windows and they only come with Windows drivers. They're commonly referred to as Winmodems.

If you have a standard hardware modem, there's only one way to make a significant improvement to its performance. You can get firmware updates for older modems that will allow them to support newer protocols, like V.90, if necessary. Apart from that, software updates make little difference. If your current modem doesn't support the 56K standard that your ISP uses, or if it's just not very good, you should consider buying a new one.

Host-based modems can have compatibility problems. Some are unable to connect at all to particular kinds of ISP-based modems, or they may not reach the same connection speeds as hardware modems.

Winmodems, unlike hardware modems, have complicated driver software, so upgrades can make a significant difference to their performance. If you use a Winmodem, check the manufacturer's Web site to see if you can get a later driver.

There are many ways you can tweak the software settings for a modem Internet connection, but most of them are a waste of time. There are a lot of TCP/IP settings you can adjust, but few make any difference to the average Internet connection. Some people can make use of these settings to improve the performance of certain FTP and Telnet applications, but for most Internet applications there's no reason to. The only modem tweak that does significantly affect both latency and bandwidth is the port speed setting.



Modem properties

Go to Device Manager and look at the Properties for your modem. The Modem tab of the Properties is where you set the port speed.

For all ordinary modems, this is how fast the computer-to-modem connection is over the serial cable. It is only indirectly related to how fast bits can be sent between two modems. For instance, if the port speed is 57,600bps, and you have a 56K modem that's connected at a download speed of 48,000bps, your port speed will limit the speed of your modem when you're downloading compressible data with compression turned on (which it is by default).

Wind up the port speed to 115,200bps and you will see a slight bandwidth

improvement, thanks to compression. You should also notice a slight latency improvement, because the faster port speed allows data to get into and out of the modem buffers slightly sooner. The difference isn't big — probably less than 10 milliseconds — but modem gamers need all the help they can get. Port speeds above 115,200bps, even if they are supported by your hardware, won't work any better than 115,200bps.

Some people say you should turn off all compression for a modem Internet connection. You should ignore this kind of advice.

Almost all current modems have enough processing power to compress and uncompress data faster than they can send or receive it. Turning off compression just reduces your Web surfing speed a bit, and does nothing for your latency.

Another kind of compression, IP Header Compression, will improve your latency if it's supported by your ISP. Header compression is turned on by default in Windows. To see the setting, right-click on the appropriate connection icon in My Computer. Click on Dial-Up Networking, select Properties, select the Server Types tab, and click on TCP/IP Settings.

Broadband tweaking

Many cable, DSL, ISDN and other broadband users tweak TCP/IP in various ways, but these tweaks are often pointless, and can be harmful. There is one thing that may be worth changing. If you have high latency — as often happens when you're connecting to distant servers from a broadband connection — you can improve throughput by increasing the DefaultRcvWindow setting. It is 8,192 bytes in Windows by default, but can be set to anything.

You can change this setting without manual Registry editing by using a simple utility like RZCONN (<http://www.demonspawn.net/rzconn.htm>), which is on disc 1 of this month's cover CD. RZCONN also allows you to change your TTL (Time To Live) setting, but TTL is not worth adjusting.

Daniel Rutter can be contacted at dan@dansdata.com. For a complete archive of APC Step by Step columns, see <http://apcmag.com/step/>.



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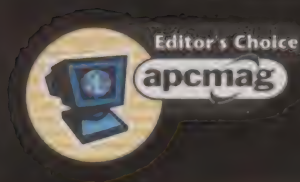
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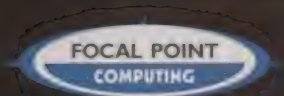
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Just do it yourself

Creating your own computer game sounds like fun, but there's a reason why most good games take a year or more to develop, as **Angus Kidman** discovered.

At the heart of this story is a simple fact that has nothing to do with technology: I loathe Celine Dion. Nothing irks me more than her over-emoted, over-produced MOR schtick, except possibly the fact that it's so massively successful.

Moreover, I'm not willing to simply keep my hatred to myself—I want to share it with the world. At first I was content with routine abuse of Ms Dion on my Web site, but with so many other people determined to attack the caterwauling human breadstick (Celine Dion hate sites merit their own category at Yahoo), I wanted a more individual approach. And so I decided to develop an anti-Celine Dion game.

I hadn't worked seriously on developing computer games since the late 1980s when, like many a geeky teenager before me, I spent hours in front of an 8-bit machine laboriously typing in and modifying magazine listings. From there, I progressed to creating my own games. In those pre-Net days, I had a relatively obscure machine (the Amstrad CPC 6128), so almost no-one, aside from my brother, got to play them. After he gave the thumbs down to a neatly designed but stupid game called *Mountain* (it included a sequence in which the player had to travel from one side of the screen to the other while avoiding a single bomb which didn't actually move), I decided to leave game developing to the professionals.

However, I was forced to reconsider my position when I found myself thinking that murder would be a socially acceptable response to hearing 'My Heart Will Go On' one more time. A game seemed less likely to get me arrested, and aside from the fact that I'd have to work on graphics of Celine's face, it might even be fun.

I didn't want to repeat the mistakes I'd made with *Mountain*. In my new software developing persona, I wanted things to be different, focused, even semi-professional. I wanted a game that looked halfway decent, that used fairly standard controls, that had zappy sound effects and that

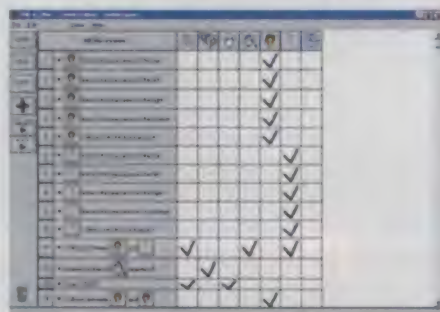
could be distributed easily over the Net. I eventually achieved the last goal, but most of the others eluded me along the way.

Selecting your tools

Despite my previous amateur programming experiences, I didn't want to do anything as drastic as learning Visual Basic just to have a go at Celine Dion. I toyed briefly with the idea of using Macromedia's Shockwave, which allows you to do all



Escape The Killer Celines! begins to take shape in Klik & Play's level editor.



Gameplay is determined using the event editor's selection boxes.

kinds of neat interactive stuff if you put in the hours needed to master it. In the end, I settled for a product called Klik & Play (K&P) developed in France (K&P is now known as Multimedia Fusion, see review on page 113).

Unlike more general development environments, K&P is specifically

designed for developing games under Windows. It doesn't rely on a programming language; instead, you create a series of objects (backgrounds, players, sounds and so on) and define the way they interact. The only major restriction is that you can't sell games created with it, but I wasn't in this for the money.

By the time I discovered K&P in late 1998, it was already three years old. This explains why it can still develop software that runs on any Windows platform from 3.1 onwards. No revisions had come out during that time, but the product continued to sell.

After reviewing it for a 1998 roundup of general game creation tools, I felt confident that this was the best platform on which to virtually eviscerate Ms Dion. At this stage, I had a number of publicity shots of Celine from her official Web site and venomous hatred coursing through my veins. What I needed was a concept.

My first idea (I'd hesitate to call it original) was to pursue Celine Dion through a platform/maze environment with a gun that never ran out of ammunition. However, I quickly abandoned this plan because of a restriction in the way K&P works; it doesn't offer any kind of lockable grid when you are placing objects in the game background, making it very hard to build environments with any geometric consistency. (This problem is apparent in some of the public domain *South Park* platform games built using K&P; all the scenes look like they've just been hit by an earthquake.)

The background editing tools in K&P were so limited (for instance, there was no easy way to vary the background from scene to scene while keeping the same fundamental gameplay rules) that I quickly abandoned the plan to design my own series of backdrops and opted for one of the built-in backgrounds. Sparing the world my undeniably dubious artistic talents was an added bonus.

K&P allowed me to easily assemble complete executables without having to

worry about the niceties of compilation, but it restricted the way the game could be designed. This is an all-too common scenario in development: your choice of tools often dictates the form of your software.

For the background, I eventually chose one of the supplied images: a theatre with an uncanny resemblance to the *Muppet Show* set. I briefly contemplated giving Miss Piggy a cameo role, but decided that even in a non-profit game that could raise copyright problems. Instead, I added a ghostly image of the Dionster, created by applying a polarising effect.

After experimenting a little, I came up with a basic premise for the game, now entitled 'Escape The Killer Celines!' (ETKC! for short). The player is trapped in the theatre with a rampaging Dion, and has to avoid all contact with her — touch her and you die. To add to the challenge, an additional Dion appears onscreen every 15 seconds (a none-too-subtle reflection of my feelings about on her mass-media dominance). While Dion bounces diagonally all around the screen, the player is restricted to the standard up, down, left and right keyboard commands have those keys.

In development terms, ETKC! was extremely simple to achieve, and only

required four main elements on the screen: a timer, an indicator of how many lives were left, a figure for the user and Celine herself. The first two elements were supplied with the development environment (which is sensible; how many games have you played that don't include a fixed number of lives?). All I had to do was design the Celine and user graphics and program the behaviour of the objects.

The programming was done in the K&P event editor, which used a simple 'checkbox' interface to assign specific actions to given objects in the game. These actions included what happened when either the player or Celine hit the outer boundaries of the board (Celine veers off randomly, the player bounces back in the opposite direction); when a key is pressed (the player changes direction); or when a given period of time has passed (a new Celine appears).

Editing by mouse-click in this way was very simple, but I sometimes yearned for a scripting language, which would give me greater control. I wished even more frequently that the system had proper cut-and-paste options, so that I could copy similar behaviour and then just modify it as needed, rather than going through the entire definition process each time.

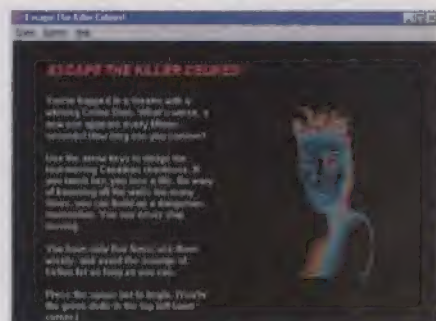
The graphics were much more difficult. It took quite a bit of work just to shrink down Celine's head and keep it vaguely recognisable. K&P allows you to change the appearance of a graphic based on the direction it moves in, but I soon abandoned this approach as it was impractical for a small photographic image; it just didn't look right. A cartoon caricature would have been simpler, but I lack any artistic talent and wasn't inclined to pay someone to come up with a drawing. I used a supplied icon for the player; I hadn't originally planned to make the character lime green, but it seemed the best colour to stand out against the backdrop.

Once the basic gameplay was completed and tested, there was only a small amount of tidying up to do. I wrote a simple rules screen that launched when the game began, and another for the inevitable moment of defeat. Using DoReMix (my favourite compositional tool), I came up with some generically cheesy AOR background music, which quickly became so annoying that I was reaching for the mute button on my toolbar. I exported the game in executable format and zipped up the files.

And that was that. In the space of a few hours of one weekend, I'd developed a playable, if far from earth shattering,



A ghostly image of Celine is set against a *Muppet Show*-style backdrop for maximum effect.



The finished product. A Celine-induced death is inevitable.

game. I whacked it up on my Web site, where it has since received the occasional favourable email from fellow Dion loathers. (If you're keen to try it yourself, it's on this month's cover CD.)

So, what lessons did I learn about games development? Probably the most important is that (surprise, surprise) it really isn't a one-person task. I think I'm up to grappling with logic and gameplay issues, but I definitely needed someone with artistic flair and patience to develop the look of the game. Extra animation would have given the package an edge; while it looks better than many of the mid-'80s 8-bit games I grew up on, it's like amateur night at the local RSL next to even the lamest commercial PC game.

The second lesson is that a full-blown development environment would better handle any game of more than moderate complexity. Although this might make certain tasks harder, the additional flexibility and control would probably be worth it. It would also give me new skills that might actually further my career.

Finally, the notion that expunging your hate is cathartic is a crock. Despite having written the game, I hate Celine just as much as ever.

Angus Kidman can be contacted at akidman@acptech.net. For a complete archive of APC Just DIY columns, see <http://apcmag.com/justdiy/>.

Cheat mode

I wanted ETKC! to have a built-in cheat mode, like any commercial game, so I added a feature to allow players to reset the number of lives in the game back to the original five at any point. As with many cheat modes, this was also useful during the development phase. Even though it's an extremely simple game, I'm not very good at ETKC!, and having an endless number of lives was handy for testing.

However, in an object lesson about the importance of maintaining good development documentation, I failed to note exactly what this keyboard shortcut was, and 18 months later, I've completely forgotten it. I know it was Ctrl and another key, but I can't remember which one. Editing the original source doesn't help, because K&P shows the key press as an invisible character between quotes, and only allows it to be changed, not displayed. Of course, I could create a new cheat key and recompile the game, but that would hardly be fair to existing users.

Insite

If your site has news that you update frequently, adding a dynamic news page might save you time. Instead of hard coding all your news text into an HTML page, you can simply add it to a plain text file which your news page imports in real time as the page is processed by the server.

The dynamic news page that we will create demonstrates how to use an Active Server Page (ASP). It uses a text file in much the same way as you might use a database on the Web. In fact, with a few modifications you could replace the text file with a Microsoft Access database quite easily.

It is more efficient to use a database if you plan to have a large number of news items on your site, or you want to build an administration page for the database. Without an administration page, maintaining a database is more trouble than it's worth. By using a text file instead, you minimise the amount of work required to update your news page. You also avoid other issues such as database security and administration, not to mention the cost of database hosting.

If you have any experience using JavaScript, Visual Basic or another programming language, you will find this exercise straightforward. We've used VBScript, which is the default language for ASP. It is also possible to use Perl or JavaScript for ASP, but it is unusual to do so. If you are new to the concepts of loops, variables, functions and objects, read the glossary on page 132 before moving on.

Step 1: Create the news page

The first thing you'll need is an empty page with your site's navigation template, footers and so on already in the code (see listing 1). If you save this file as news.asp and open it up in a browser it should look like figure 1.

You can open an ASP file from your hard disk, as it will contain all your ASP code. However, to view an ASP page correctly, it will need to be run from a Web server so that the script is processed before being sent to the browser. For

instance, if you're running Microsoft's Personal Webserver on your desktop PC, you call up the page from this URL: <http://localhost/news.asp>.

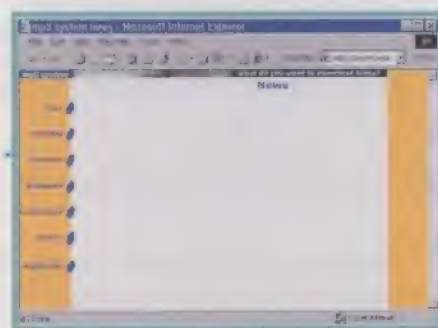


Figure 1

Step 2: Create the text file

The next step is to create a text file called news.txt in the same directory as your news.asp page. The news.txt file needs to follow certain formatting rules so that the news.asp page can understand its contents.

As you can see from the example, the pipe character (|) separates the date, title, URL and text of a news item, and the tilde character (~) separates each news item. Even if your news item doesn't have a URL, you will still need to include the extra pipe character so that your news.asp page can determine where the text starts. You also need to be careful to include a tilde at the end of your last news item, because the news.asp page uses the number of tilde characters in the text to count the total number of items.

24th April, 2000

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22nd April, 2000

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<http://www.sulaco.org/mp3/>

ILAME is not an mp3 encoder. It is a GPL'd

patch against the dist10 ISO demonstration source. LAME is totally incapable of producing an mp3 stream. It is incapable of even being compiled by itself. You need the ISO source for this software to work.~

Step 3: Read the text file

By saving your news page with an ASP file extension instead of an HTML extension, you are instructing the server to process any scripting on the page before sending the result to the browser. Sections of script are defined in an Active Server Page by using `<%` and `%>` tags as shown below. Comments in the code are preceded by a single quotation mark, and an underscore indicates that the code wraps onto the next line.

```
<%
'specify the news file
whichfile=server.mappath(".") & "\news.txt"

'read the file into a string variable using the
'filesystem object
Set fs = _
CreateObject("Scripting.FileSystemObject")
Set thisfile = fs.OpenTextFile(whichfile, 1, _
False)

'store the file text in a variable
newstext = thisfile.ReadAll
%>
```

The first thing this script does is define the location of the news.txt file. The server.mappath method takes a URL — in this case the ".", which specifies the current directory — and 'maps' it to its full server path, which in this case is C:\inetpub\wwwroot\. By using the server.mappath method you avoid the possibility of hardcoded paths in your scripts becoming redundant. It also means you don't need to know where your site is stored on your ISP's server.

Now a variable called whichfile exists that contains the string C:\inetpub\wwwroot\news.txt and is ready to be fed into the filesystem object. The filesystem object is a COM component built into ASP that allows reading from and writing to directories and files on the server.

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BY HALLMARK

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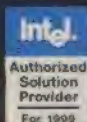
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Insite source code

Listing 1: Creating the HTML template

```
<html>
<head><title>mp3 system news</title></head>
<basefont face="verdana,arial,Helvetica" size="1">
<body bgcolor="White" background="images/bg.jpg"
leftmargin=0 topmargin=0>

<table width="640" border="0" cellspacing="0"
cellpadding="0" align="left">
<tr><td colspan=2></td></tr>
<tr><td valign=top><a href="index.asp"></a></td>
<td valign=top><font size="+1"
color="Blue"><b>News</b></font><br><br></td></tr>
</table>
<br><br><br>
</body>
</html>
```

Listing 2: Formatting news items

```
'create variables for each news item
for x = 0 to newscount - 1
    newText = newsarray(x)
    'get date
    pipe = instr(newText,"|")
    thedate = left(newText,pipe - 1)
    newText = mid(newText,pipe + 1)
    'get title
    pipe = instr(newText,"|")
    title = left(newText,pipe - 1)
    newText = mid(newText,pipe + 1)
    'get url
    pipe = instr(newText,"|")
    url = left(newText,pipe - 1)
    newText = mid(newText,pipe + 1)
    'get info
    newText = trim(newText)
    info = replace(newText,vbCrLf,"<br>")

    'write out the news!
```

```
response.write("<b>" & title & "</b><br>")
response.write("<i>" & thedate & "</i><br><br>")
response.write(info & "<br><br>")
response.write("<a href=" & url & " " _
target=" "_blank">")
response.write(url & "</a><br><hr>")
```

next

Listing 3: The finished ASP page

```
<html>
<head><title>mp3 system news</title></head>
<basefont face="verdana,arial,Helvetica" size="1">
<body bgcolor="White" background="images/bg.jpg"
leftmargin=0 topmargin=0>
<table width="640" border="0" cellspacing="0"
cellpadding="0" align="left">
<tr><td colspan=2></td></tr>
<tr><td valign=top><a href="index.asp"></a></td>
<td valign=top><font size="+1"
color="Blue"><b>News</b></font><br><br>
<%
'specify the news file
whichfile=server.mappath(".") & "\news.txt"

'read the file into a string variable
'using the filesystem object
Set fs = CreateObject("Scripting.FileSystemObject")
Set thisfile = fs.OpenTextFile(whichfile, 1, False)

'store the file text in a variable
newText = thisfile.readall

'close the file and get rid of the filesystem object
thisfile.Close
set thisfile=nothing
set fs=nothing
%>
</td></tr></table>
</body>
</html>
```

To use the filesystem object, you first need to create an instance of it using the CreateObject function. Once you've done this, you need to use the OpenTextFile method on the new object to create another new object to hold the file open for reading. The last step is to call the readall method on the thisfile object to read its contents into the variable called newText.

Having collected the text from the news.txt file, your ASP page has finished with the filesystem object so you should

dispose of it by calling the close method and then setting both the fs and thisfile objects to nothing.

Step 4: Count the news items

Your news is ready to send to the browser, but there are still a few things that need to be done in order to present it as HTML rather than the raw text form it's in now. First, work out how many news items there are in the text. As there is no search function in ASP that will return a num-

ber of occurrences of a string, you need to loop through the whole text and test each character.

In the code shown above, a for loop is used to cycle through newText and the mid() function is used to test if the character at position x is a tilde. If it is, then a variable called newsCount is incremented. When the loop has finished, the response.write method is called to print HTML code to the page that indicates how many news items were discovered in the text.

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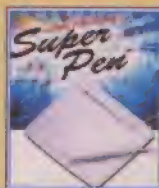
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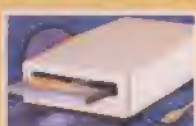
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Step 5: Separate the news items

Now that you know how many news items are contained in the newstext variable, you can loop through and separate them. An array has been used to store the news items here, but you could use string variables or any other technique. In ASP, you need to declare an array before using it. In the code below, DIM is used to create a new array called newsarray(), and then REDIM is used to specify its size. This is one less than the number of news items because the first item in an array is indexed by the number zero, not one.

Once the array has been created, loop through and populate it as you go. Every time a tilde is found in the newstext variable, the left() function is used to 'crop' the text to the left of the tilde and place it in the array. Then the mid() function is used to remove the text left of the tilde from the newstext variable. By the end of the loop, the newstext variable will be empty and the newsarray() array will be filled with the individual news items.

```
'find out how many news items we have
newsCount = 0
for x = 1 to len(newstext)
    if mid(newstext,x,1) = "~" then
        newsCount = newsCount + 1
    end if
next
```

```
response.write(newsCount & " news _
items<br><hr>")
```

```
'create array of news
DIM newsarray()
REDIM newsarray(newsCount-1)

for x = 0 to newsCount - 1
    newsarray(x) = _
        left(newstext,instr(newstext, "~")-1)
    newstext = _
        mid(newstext,instr(newstext, "~")+1)
next
```

Step 6: Format the news items

The last stage in displaying your news is to loop through newsarray() looking for pipe characters, and separating the date, title, URL and text before formatting it as HTML. In this loop the Instr() function is used. This searches 'in a string' for another string (in this case, a single pipe character) and returns its position. As the location of the first pipe defines the end of the date, the

left() function is used to assign all characters left of the pipe to a new variable called thedate. Using mid(), the date is then removed from the newstext string and you proceed to the next pipe, which defines the end of the title. Once the title has been stripped out, proceed to the URL and lastly, the text, which is assigned to a variable called info.

info is treated a little differently to the other variables because it is subjected to the replace() function. In this case, look for carriage returns (which are called vbcrf in VBScript) and replace them with the HTML equivalent to a line break, which is
. The result is that any paragraphs that occur in the original news.txt file will be replicated in the ASP page (see listing 2).

The last thing to do on the news page is display the news items embedded in the HTML tags. The five response.write lines do

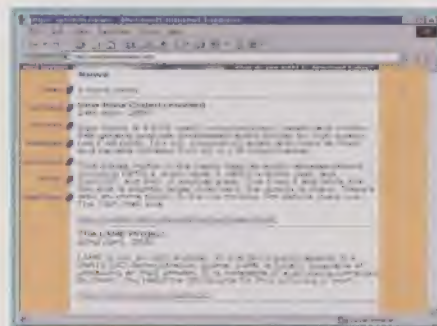


Figure 2

this, including formatting the URL as a link so that the final page looks like figure 2. The finished code in news.asp looks like listing 3.

Conclusion and suggestions

Now you have a news page that will format your news so that you only have to upload a plain text file to your site when you want to update it. You could modify the page to cope with less (or more) fields for your news, to include things like an email address or subheading.

You could also use individual text files for each news item and have the filesystem object automatically open the most recent files and use their system dates. Another idea is to have a text file called oldnews.txt, where you archive your older news items so that they don't 'disappear' from your site when you update it. However, once you get to this stage, you might want to think about using a database to manage your news.

Daniel Potts can be contacted at daniel@indigointeractive.com.au. For a complete index of APC Insite columns, see <http://apcmag.com/insite/>.

Glossary

A **variable** is a placeholder used to store information in a script. A text variable is usually referred to as a string, and an array variable is actually a set of variables grouped together for convenience. In VBScript there is no differentiation between a numeric and a text variable, so if you use a mathematical function on a variable, VBScript will attempt to treat it as a number — likewise with strings. If you use a string function on a variable, it treats it as a string.

An **array** is a variable that contains data elements sequentially indexed from zero upwards. Referencing an item in an array is done by using the array name followed by the item's index number in parentheses. For example, MyArray(2) refers to the third element in the array called MyArray.

A **procedure** is a set of commands that are grouped together, given a name, and can then be run from anywhere in a script.

A **function** is a type of procedure that is capable of returning a value. For example, if you send a number to a function called multiplyByTwo(), the function will perform its calculation and return a value — in this case, your original number multiplied by two.

An **object** is a programming interface to another application. Occasionally in ASP you'll need to work with other programs or files in addition to Web pages, as in our news page example. To do this, you create an instance of an object — in our case, the FileSystem Object — that handles this function for you.

Loops allow you to perform tasks repeatedly. There are several ways to perform loops in ASP, but in the example, For . . . Next loops are used. A For . . . Next loop assigns a number to a variable and increments that variable with every round of the loop until a maximum is reached.

Useful ASP resources

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- <http://learnasp.com/>
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Follow our step-by-step guide to successfully install Windows 2000 Professional. By Kieran MacNamee

Windows

This month, Workshop will walk you through the steps required for a successful Windows 2000 installation. There are a number of things to consider before committing to the setup process.

Preparation is key

Before installing Windows 2000, check that your system is capable of supporting it. The minimum requirements for this operating system are a Pentium 133 with 64M of RAM and 650M of hard disk space. To ensure that your hardware will be compatible with Windows 2000, check the Hardware Compatibility List stored in the Support folder on the Windows 2000 CD, or at <http://www.microsoft.com/hcl>. For other compatibility issues, visit the Windows 2000 upgrade Web site (<http://www.microsoft.com/windows2000/upgrade/>).

Your system's BIOS may need to be upgraded to get the most out of Windows 2000. To identify the correct update, you need to know specific details about your computer. Microsoft explains BIOS compatibility at <http://www.microsoft.com/windows2000/upgrade/compat/biosissue.asp>.

Which installation method?

There are three methods to choose from to install Windows 2000: an upgrade, a fresh install or a dual-boot installation.

It's possible to upgrade from Windows 95/98, and Windows NT 3.51 or 4.0. If you have a prerelease version of Windows 2000, you might not be able to perform a straight upgrade to the full version.

A clean install involves reformatting your hard drive so Windows 2000 can be

installed from scratch. This takes more time and effort than an upgrade, but will result in a clean system that is less likely to have disk problems or file structure errors.

Alternatively, you can create a separate partition and install Windows 2000 alongside your old version of Windows using a dual-boot system.

Whatever installation option you choose, it's good practice to back up important data such as documents, games, settings and so on, just in case something goes wrong.

The upgrade method

If you are upgrading, Windows 2000 will replace your current version of Windows while retaining all your settings and programs. After inserting the CD, an installation menu will be displayed (if the installation CD does not autorun, run SETUP.EXE from the CD). Click on Install Windows 2000, then on the Upgrade option. Next, you will have to accept the licence agreement and enter the 25-character product key.

Windows 2000 provides support for NTFS, a file system that provides greater security and reliability than FAT32. Unless you are going to have a dual-boot system with Windows 95/98, it's best to convert to NTFS when you are prompted to make this decision, for security and file management reasons. Once you decide whether or not to convert, the setup program will scan your system and copy some installation files before restarting in a non-graphical DOS-like interface. From here you don't have to do anything; the setup program checks your disks, copies more files and restarts once again. There is quite a long wait while the setup program detects and installs any devices. After one final restart, your new Windows 2000 system is ready to use.

If you have a prerelease version of Windows 2000 installed on your system, upgrading to the full release might involve a couple of extra steps. It is possible to upgrade to the full version from Release Candidate (RC) 2 and 3. Unfortunately, there is no one-step upgrade available from Beta 3 to the full version. You'll either have to upgrade to RC2 or RC3 and then to the full version, or you



It's easy to install Windows 2000 from an existing installation of Windows 98.

will have to format your drive and start from scratch. For more information on upgrading from a beta version, go to <http://www.microsoft.com/windows2000/upgrade/path/beta.asp>.

If you received a 120-day evaluation version of Windows 2000 from Microsoft's TechNet subscription service, you'll find helpful information on upgrading to the full version at <http://www.microsoft.com/technet/subscription/win2kugp.asp>.

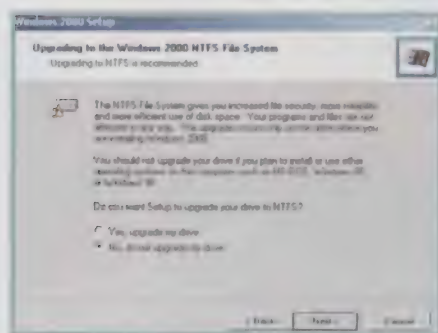
A fresh install

If you make a completely fresh start with Windows 2000 as your only operating system on a newly formatted drive, you have to boot into a DOS-like setup menu. If your system can't boot from a CD, you can use the floppy boot disks that came in your Windows 2000 package. If you do not have these boot disks, you can create some yourself with a utility on the CD. Format four floppy disks then open the \Bootdisk folder on the Windows 2000 CD. On a Windows 95/98 machine, run the MAKEBOOT utility; on an NT machine, run MAKEBT32. Follow the prompts to create your boot disks.

Installing to an empty drive is similar to the upgrade method, but you will have to provide additional information and system settings.

As with the upgrade method, it's best to convert to NTFS to take advantage of the added features. After integrity tests are run on the formatted partition, a number of files will be copied to your hard drive and the system will restart. The setup program will then boot into a graphical setup mode.

When all the devices are installed there are some settings to configure. Configuring the Regional Settings is fairly straightforward.



Windows 2000's setup application gives you the option to convert your FAT32 drives to NTFS.



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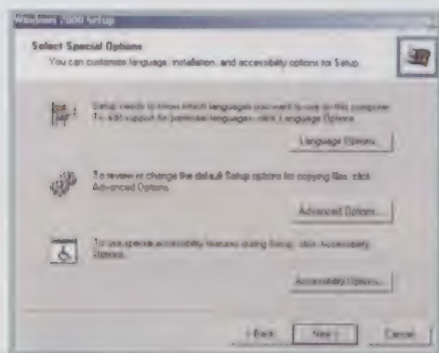


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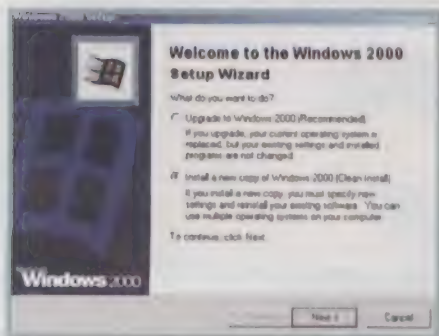
ward (our locale is English in Australia). Next, personalise Windows 2000 with your name and organisation. You will then be asked to choose a computer name and a password for the administrator account. Replace the randomly generated computer name with one more meaningful to you. If you are on a network make sure the name does not conflict with any others.

You will be given a list of optional components to install, but these can be installed later. When adjusting the date and time, remember to use the correct time zone, (GMT+10 for the eastern states) and enable daylight saving adjustments. If you are connected to a network, you will be given the opportunity to set that up. Next, the setup program will copy the rest of the system files to your hard drive. You can then reboot into your new operating system.

Once Windows 2000 is installed you will have to install all of your programs as well as the latest drivers for your hardware. Windows 2000 has a driver set containing about 7,500 drivers. Your keyboard and mouse generally only need the generic Microsoft drivers, but other devices may not work optimally or provide all available features without the most up-to-date manufacturer drivers. These might not be on the Windows 2000 CD, so search the Web to ensure you



During installation the Setup Wizard gives you the opportunity to configure Windows 2000 according to your location and operational requirements



... the setup scans your system, copies some installation files to it and then reboots it into a non-graphical DOS-like interface.

install the most recent ones. Try to install drivers that are Microsoft certified, or labelled as WHQL (Windows Hardware Quality Labs) certified. These drivers are tested to ensure that they perform to specifications without sacrificing stability.

Dual booting

In a dual-boot system, Windows 2000 can be installed on the same partition as a previous version as long as it is in a different directory, but this is not advisable.

If you do not have an empty partition that is big enough to install Windows 2000, you'll have to create one. Creating partitions is not difficult if you have the correct tools. Third-party partition tools are available for purchase and some can be downloaded from the Internet. A program such as Partition Magic (<http://www.powerquest.com/partitionmagic/>) has many useful features and its documentation helps explain what it's doing to your hard drive. Alternatively, you can use Microsoft's Fixed Disk setup program, which can be run from the command prompt by typing FDISK.

However, if your entire hard drive is partitioned as a single primary partition, FDISK won't be able to resize it to make room for a second partition. You will have to start from scratch and create a new drive structure with two separate partitions. You will also have to reinstall your original version of Windows as well as Windows 2000. If you already have a primary partition and an extended partition, you can use FDISK to add and remove as many logical partitions as you like (see APC April 2000, page 124). For Windows 2000, try to make the partition at least 1G.

Once you have a separate partition for Windows 2000, you can begin the setup process. From within your current version of Windows, insert the installation CD and select Clean Install. A number of options will be displayed. Click on the Advanced button and specify where the Windows 2000 setup files are located (most likely your CD-ROM drive). If you are going to install Windows 2000 in the same partition that contains Windows 95/98's own partition, you will have to choose the folder where Windows 2000 will be installed (do not select the directory that contains your current version of Windows).

If you are installing Windows 2000 in a separate partition, the procedure is almost identical. However, you must check the option that allows you to select the installation partition during the setup process.

Windows shareware

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All these packages can be found on this month's cover CD, along with more detailed reviews.

You will be asked if you want to convert your file system to NTFS. If you are installing Windows 2000 within the same partition that contains Windows 95/98, then steer clear of NTFS. Windows 2000 is able to recognise NTFS, FAT and FAT32, but Windows 95/98 will not be able to recognise NTFS partitions. If you already have Windows NT installed, it is likely that you are already using NTFS. If in doubt, do not convert to NTFS — you can always convert to NTFS later on but you cannot switch back to FAT32. The command to convert your FAT32 drive to NTFS is `convert X: /fs:ntfs`, where X is the drive you want to convert.

Windows 2000 will automatically recognise that there are multiple operating systems and will offer a menu every time you start your computer. You can change which version of Windows boots by default as well as how long the operating system menu is displayed during startup. To do this in Windows 2000, right-click on My Computer and select Properties. Move along to the Advanced tab and then select the Startup and Recovery option.

Kieran McNamee can be contacted at kmcnamee@acp.com.au. For a complete archive of APC Windows columns, see <http://apcmag.com/windows/>.



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DEALER ENQUIRIES

WELCOME

Exploring *init* and the System-V initialisation scripts used in most Linux distributions. By Geoffrey Bennett

Linux

The first program the kernel runs after its device drivers have been loaded and the root file system mounted is */sbin/init*. The configuration file for *init* is */etc/inittab*, and the major parts of an *init* file are shown in listing 1.

Each line in *inittab* that isn't a comment (ie. doesn't begin with #) follows a particular format that describes which programs are to be run by *init* in each runlevel. The format is identifier:runlevels:action:program. Each field has a specific purpose.

The identifier field provides a one to four-character name for the line. The identifier must be unique. It's usually an abbreviation of what the program is or does, but for a *getty* process (which prints your login prompt), it needs to be the terminal name without the leading *tty*. For example, the identifier for a *getty* process running on the first serial port (*/dev/ttyS0*) would be *S0*.

The runlevel field lists the runlevels in which the program is to be run. For example, the X display manager is usually set up to run in runlevel 5 only, but the *mingetty* processes are normally used in runlevels 2, 3, 4 and 5. The usual modes attached to each runlevel are as follows.

0	halt
1	single user mode
2	multiuser, without NFS
3	full multiuser mode
4	unused
5	X11
6	reboot

The action field contains a keyword (eg. *respawn*, *wait*, *once*) that indicates how a program should run. The program field contains the name of the program to be run, and any arguments.

inittab action keywords

The most interesting action keyword is *respawn*. This tells *init* to run the specified program in the appropriate runlevel, and to start up another copy when that process finishes. You can see in the example *inittab* file that this is used for the *mingetty* processes.

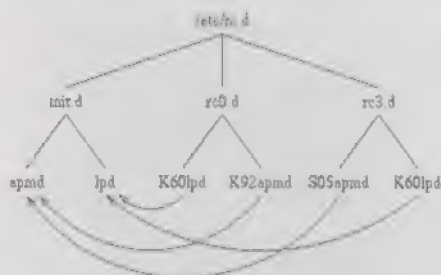
To observe this in action, make sure that the second virtual console is sitting at a login prompt, then log in to the first virtual console, and type *ps auxw | grep tty2*. You'll see a process like this running:

```
root 14718 0.0 0.6 1092 408 tty2 S 13:11
0:00 /sbin/mingetty tty2
```

Switch to a second virtual console and type in a login name, but don't type a password yet. Switch back to the first console, run the *ps* command again, and you should see the output below.

```
root 14718 0.0 1.3 2108 868 tty2 S 13:11
0:00 /bin/login —
```

Although the *mingetty* process has gone, it has left behind a new *login* process with the



The layout of the */etc/rc.d* subdirectories, showing the Start/Kill symbolic links

same process ID (PID). As a process with the same PID as the original *mingetty* process still exists, *init* won't start up another *mingetty* process yet on that console.

Next, type your password on the second virtual console, repeat the *ps* command and you'll see something like this.

```
root 14718 0.0 1.7 2232 1112 tty2 S 13:11
0:00 login — geoffrey
geoffrey 14830 3.7 1.6 1208 432 tty2 S
13:25 0:00 -bash
```

Once *login* has validated your password, it spawns your login shell (in this case, *bash*). The *login* process usually hangs around until you log out, but on some systems it will replace itself with your shell instead (in a similar way to how *mingetty* replaces itself with *login*).

Once you log out, the *login* process will wake up, perform its last duties, and exit. Following this, *init* will notice that the process with our example PID 14718 has exited, and it will start another *mingetty*. The process will look like the following.

```
root 14886 0.4 0.6 1092 408 tty2 S 13:33
0:00 /sbin/mingetty tty2
```

init is intelligent in that if it notices that it is respawning the same program in rapid succession, it will disable that entry for a few minutes. This is to help prevent a high system load in case a program that *init* is meant to be respawning doesn't work correctly. This occurs mainly when you misspell a program name in */etc/inittab*, or you delete a program that is referenced by *inittab*.

To see this for yourself, press *Ctrl-D* at a console login prompt about 10 times. You should see a message like the one below, which means you won't get another login prompt for a while.

```
INIT: Id "2" respawning too fast: disabled for
5 minutes
```

If you ever get the above message you mightn't want to wait five minutes until *init* tries again (for example, if you fixed the problem that was causing the program to exit so quickly). In this case, type either *kill -1 1* or */sbin/telinit q*. This acts as a request to *init* to reread its configuration file and enable any programs that were disabled.

The *wait* action in */etc/inittab* will run the specified program, and *init* will wait until the program has finished executing. Unlike *respawn*, when the program finishes it won't be run again. In our example *inittab*, *wait* is used for running the */etc/rc.d/rc* script, which is a key part of the System-V *init* scripts.

The *sysinit* action specifies a program that is to be run just once when the system boots (before any particular runlevel programs are run). The list of runlevels is left blank for the *sysinit* action, because it is irrelevant here.

Finally, the action *initdefault* defines the default runlevel for your system. The program name is ignored, and should be left blank.

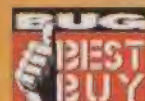
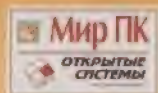
The examples above illustrate the most common actions. For further information, see the *inittab(5)* manual page.

init.d scripts and services

Although *init* can be used to start and stop services (like *xdm* in listing 1), there is a more flexible method that is used for most other services; this is the System-V *init* scripts scheme.

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The first part of this scheme is that one script in the `/etc/rc.d/init.d` directory (`/etc/init.d` in some distributions) is kept for each service, and each script must be able to take a single argument of either start or stop. For example, if you wanted to stop the printer service (`lpd`) immediately, you could type `/etc/rc.d/init.d/lpd stop`.

Each script will take start and stop as a parameter, but there are a few other parameters that are available for most services.

status

This tells you whether or not the service is running. For services with more than one daemon (like NFS, which has a mount daemon and quota daemon as well as the main NFS daemon), it shows you the status of each daemon.

restart

This is a shortcut for stopping and restarting a service.

reload

This asks the service to reread its configuration file. It is preferable to use reload rather than restart in many cases, to avoid a short period where the service is not running.

The `/etc/rc.d/rcx.d` directories

The directories `/etc/rc.d/rcx.d` form the next part of the System-V init scripts scheme. Here, *x* refers to a particular runlevel (0 to 6). (Some distributions store these scripts in `/etc/rcx.d` directories.) Listing 2 shows the contents of a sample `/etc/rc.d/rc3.d` directory.

As you can see in the listing, there are many symbolic links, each pointing to one of the scripts in the `init.d` directory. When changing to a new runlevel, the names of the symbolic links are used to determine whether particular services are to be started or stopped, and in what order (for example, the network service is needed by

most other services and should therefore be started earlier).

The name of the symbolic link should follow the format below.

- S (for 'Start') or K (for 'Kill') to start or stop the service in this runlevel
- A two-digit number to determine the order in which services occur (lower numbers are started and stopped before higher numbers)
- The name of the service, to ensure that the names are unique

For example, the `S05apmd` symbolic link in listing 3 means that `apmd` will be the first service to be started when changing to runlevel 3.

It is possible (although tedious) to manipulate these symlinks manually. For example, if you decided to start `lpd` in runlevel 3, you could type the following.

```
mv /etc/rc.d/rc3.d/K60lpd \
/etc/rc.d/rc3.d/S40lpd.
```

A less tedious method of manipulating these symlinks is to use the `chkconfig` program written by Red Hat. For example, to list the runlevels in which a service is enabled, type `$ /sbin/chkconfig --list lpd` and it should return something like `lpd 0:off 1:off 2:off 3:off 4:off 5:off 6:off`. To turn on `lpd` service in the runlevels where it is most commonly required, type `$ /sbin/chkconfig lpd on`. Reconfirm with the `--list` option again, and you should see that `lpd` is enabled for runlevels 3, 4 and 5.

The rc script

The final part of the System-V init scripts is the rc script, which is the bit that looks at the symbolic links and runs the scripts in the `init.d` directories.

As you can see in listing 1, the `/etc/rc.d/rc` script is run in every runlevel

with a parameter indicating which runlevel is being entered. Using this information, and the symbolic links in the appropriate directory, it's a simple matter of shell programming to perform the appropriate actions.

Listing 3 shows an example rc script minus error checking. A real rc script would also check to make sure that it is not trying to start a running service or stop a service that isn't running.

The first part of the script puts the first argument into the runlevel variable which is accessed by `$runlevel`. The first for loop takes all the K scripts from the appropriate runlevel directory, and runs them with the stop argument. The second for loop then calls the S scripts with the start argument.

If you haven't seen a shell for loop before, some simple examples might help you understand listing 3. Type the following command at a shell prompt.

```
for i in fred bob sam; do
echo $i
done
```

The shell will repeat the part between `do` and `done` three times, and each time it will set the loop variable `$i` to `fred`, `bob` and `sam` respectively.

The part between `in` and `do` doesn't have to be a fixed list. As shown in listing 3, you can use shell wildcards to generate a list of filenames. To try this, use the `echo` command below.

```
echo /etc/rc.d/rc3.d/K*
echo /etc/rc.d/rc3.d/S*
runlevel=3
echo /etc/rc.d/rc$runlevel.d/K*
echo /etc/rc.d/rc$runlevel.d/S*
```

Geoffrey Bennett can be contacted at geoffrey@netcraft.com.au. For a complete archive of APC Linux columns, see <http://apcmag.com/linux/>.

Linux freeware

XMMS

XMMS is a similar MP3 program to Winamp, with a number of great skins and plug-ins.

NotLame

This open source MP3 encoder is based on the ISO compression routines and can be used to encode within grip.

RealPlayer 7

The latest version of RealPlayer for Linux.

grip

grip is an all-in-one CD to MP3 application.

grio

This is a Gnome tool for managing your Diamond Rio PMP300 MP3 player.

BladeEnc

BladeEnc, another open source MP3 encoder, provides high-quality output with amazing speed.

All these packages can be found on this month's cover CD along with more detailed reviews.

System-V initialisation scripts

Listing 1

```
# /etc/inittab
#
# Format of this file:
# identifier:runlevels:action:program

# Default runlevel.
id:3:initdefault:

# System initialisation.
si::sysinit:/etc/rc.d/rc.sysinit

l0:0:wait:/etc/rc.d/rc 0
l1:1:wait:/etc/rc.d/rc 1
l2:2:wait:/etc/rc.d/rc 2
l3:3:wait:/etc/rc.d/rc 3
l4:4:wait:/etc/rc.d/rc 4
l5:5:wait:/etc/rc.d/rc 5
l6:6:wait:/etc/rc.d/rc 6

# Run gettys in standard runlevels.
1:2345:respawn:/sbin/mingetty tty1
2:2345:respawn:/sbin/mingetty tty2
3:2345:respawn:/sbin/mingetty tty3
4:2345:respawn:/sbin/mingetty tty4
5:2345:respawn:/sbin/mingetty tty5
6:2345:respawn:/sbin/mingetty tty6

# Run xdm in runlevel 5.
x:5:respawn:/etc/X11/prefdm -nodaemon
```

Listing 2

```
#!/bin/sh

# Get the new runlevel
runlevel=$1

# Run the 'Kill' scripts
for i in /etc/rc.d/rc$runlevel.d/K*; do
    $i stop
done

# Run the 'Start' scripts
for i in /etc/rc.d/rc$runlevel.d/S*; do
    $i start
done
```

Listing 3

```
ls -la
total 2
drwxr-xr-x 2 root root 1024 Apr 30
12:50 .
drwxr-xr-x 10 root root 1024 Apr
26 13:28 ..
lrwxrwxrwx 1 root root 13 Feb 26
1998 K15gpm -> ../init.d/gpm
lrwxrwxrwx 1 root root 15 Jan 16
18:57 K35dhcpd -> ../init.d/dhcpd
lrwxrwxrwx 1 root root 13 Apr 26
14:01 K35smb -> ../init.d/smb
lrwxrwxrwx 1 root root 15 Jun 2
1999 K50snmpd -> ../init.d/snmpd
lrwxrwxrwx 1 root root 13 Feb 26
```

```
1998 K60lpd -> ../init.d/lpd
lrwxrwxrwx 1 root root 14 Nov 11
1998 S05apmd -> ../init.d/apmd
lrwxrwxrwx 1 root root 17 Feb 3
1998 S10network -> ../init.d/network
lrwxrwxrwx 1 root root 16 Feb 3
1998 S20random -> ../init.d/random
lrwxrwxrwx 1 root root 15 Apr 26
13:28 S25netfs -> ../init.d/netfs
lrwxrwxrwx 1 root root 16 Feb 3
1998 S30syslog -> ../init.d/syslog
lrwxrwxrwx 1 root root 13 Feb 2
1999 S40atd -> ../init.d/atd
lrwxrwxrwx 1 root root 15 Feb 3
1998 S40crond -> ../init.d/crond
lrwxrwxrwx 1 root root 16 Jun 2
1999 S45pcmcia -> ../init.d/pcmcia
lrwxrwxrwx 1 root root 14 Apr 26
13:43 S50inet -> ../init.d/inet
lrwxrwxrwx 1 root root 18 Apr 26
13:28 S75keytable -> ../init.d/keytable
lrwxrwxrwx 1 root root 18 Feb 3
1998 S80sendmail -> ../init.d/sendmail
lrwxrwxrwx 1 root root 15 Jul 1
1999 S85httpd -> ../init.d/httpd
lrwxrwxrwx 1 root root 15 Feb 3
1998 S85sound -> ../init.d/sound
lrwxrwxrwx 1 root root 13 Jun 2
1999 S90xfs -> ../init.d/xfs
lrwxrwxrwx 1 root root 11 Feb 3
1998 S99local -> ../rc.local
```

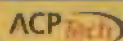
These listings can be found on this month's cover CD.

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PDA's

This month, we'll discuss how to configure your Palm device to send and receive mail from an Internet account using a modem. The Palm OS's built-in email program can't collect Internet mail directly across a PPP connection, so it's necessary to install an additional program to do this. The built-in email program only synchronises with the email on your desktop PC. (For details on how to configure this option, see *APC* April, page 141.)

What you'll need

There are several things you need to get started: a POP3 Internet mail account from an ISP, a PPP dialup account to access the Internet, and a modem to allow your Palm to access your ISP via an ordinary phone or mobile data connection. For a simple land-line solution, Palm manufactures a small snap-on modem for Palm III and V devices.

If you prefer a mobile solution, get a GSM kit for your existing mobile phone or buy one of the newer mobile phones with an IrDA-compliant port and built-in modem. There are GSM connection kits available for the Ericsson 300, 600, 700; the Nokia 2110, 5110, 6110; and Panasonic mobile phones from TDK or Options. You can also connect any one of the following mobile phones to your Palm (without any cables) via the infra-red port: the Motorola L or L+; the Nokia 7110, 8210, 8810, 8850 or 8210; or the Ericsson i888. If you decide to use a mobile phone, contact your network service provider to set up the phone's data facilities.

How to set it up

This column has previously discussed how to set up a PPP connection to the Internet (see *APC* March, page 147). To recap, you need to configure your Palm's network and modem settings to connect to the Internet. On your Palm, press the Applications button on the lower left of the silk screen. Then run the Prefs applications and select Network from the pull-down menu in the upper-right corner. Under the Service entry, type the name of your ISP and fill in your username, password, ISP phone number and connection type. Make sure you have set up these preferences correctly as shown in figure 1.

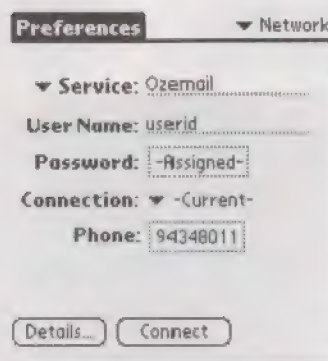


Figure 1

The connection should point to the modem that you'll be using. This allows the Palm to dial automatically whenever you try to connect to the Internet for email. Increase the Auto-off settings under the General menu in Preferences so that your Palm doesn't power off during the transfer.

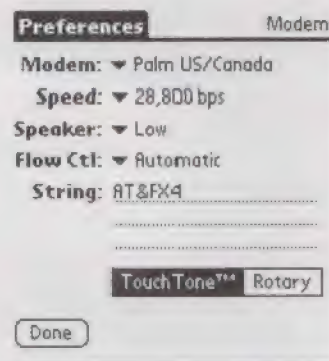


Figure 2

Figure 2 shows you how to set up the modem in Preferences so that the Palm knows what kind of modem to use.

Now that your PPP connection is set up, you need to configure your mail account settings. All of the mail clients that *APC* investigated had similar setting require-

Upgrading to Pocket PC

In a bid to steal some of the Palm's thunder (and considerable market share), Microsoft has unveiled its much-hyped operating system for handhelds: Pocket PC. The major selling points that distinguish the new operating system from its predecessors are a greater focus on personal information management, entertainment, productivity, and more effective email functions. The new OS enables you to play both in Windows Media and MP3 format, eliminating the concern for file formats. Microsoft Reader also allows you to devour *War and Peace* (or an equivalent weighty tome) without being intimidated by the page count.

Hewlett-Packard, Compaq and other manufacturers are releasing new, slim handhelds operating on the Pocket PC operating system, but a good way of demonstrating how to install the new software is with an upgrade from a lesser version of Windows CE on an existing device. Upgrading to the new OS is a simple matter of locating the tailor-made version for your particular PDA. *APC* tried it out on a Compaq Aero 1500. Once you get a hold of the upgrade kit from the

manufacturer, installation is extremely simple and even a novice can complete the upgrade in minutes.

The most important element in the upgrade kit is, of course, the Pocket PC processor chip, which slips in under the fastened protective hatch on the back of the unit. It's probably a good idea to heed the warnings of the installation guide and remove both the lithium ion battery and the backup battery before tampering with the operating system. Once the new chip is secure and the batteries have been reinserted, the system is up and running, pending a couple of screen alignments and personal data requests.

Also shipped with the Compaq upgrade kit is an updated synchronisation program called ActiveSync, which runs on your desktop PC and enables synchronisation with your device, with an added function to increase the baud rate of your device via the desktop. If the simple upgrade process is too complicated for some, there is a handy reference CD shipped with the kit for reassurance and troubleshooting.

Fiona Williams

Useful utilities and applications: Palm OS

Big Clock

A huge digital clock that displays the time and date on your Palm. It includes four time zones, four separate configurable alarms, a countdown timer and a stopwatch.

BrainForest Mobile

Organise your ideas in outline form with collapsible trees. This program is similar to the task function built into the Palm, but expands on it by letting you create detailed outlines with several levels and sublevels.

Converter

Convert length, volume, area, weight, speed and temperature into different formats — great for travellers, or just to do simple calculations.

Solitaire

This small and simple Solitaire program includes Klondike, Demon and Baker's Game. It's easy to learn and fun to play.

Third-party email programs for Palm devices

MsgAgent

This program offers SMTP, POP3, APOP and NNTP (newsgroup) support, as well as character sets in a range of languages including Arabic, Chinese, Greek, Hebrew, Japanese and Vietnamese.

MultiMail Discovery

MultiMail Discovery supports SMTP, POP3 and IMAP4 mail.

Top Gun Postman

Top Gun Postman integrates with the built-in Palm mail program for reading and sending messages. It supports SMTP, POP3 and APOP mail.

PaPi-Mail

PaPi-Mail supports SMTP, POP3, APOP and IMAP4. Basic features are available free, and a registration key that unlocks more advanced features can be purchased at <http://www.ses-soft.com/papi/>.

One-Touch Mail

A demo version of a commercial package that supports SMTP and POP3, and up to six email accounts. You can attach regular text, memos, contacts and calendars using vCard and vCalendar formats.

Windows CE/Pocket PC

Calligrapher

Enter information into your Windows CE device using natural handwriting in cursive, print or mixed writing styles.

HPC Notes

Synchronise your HPC with the notes in Microsoft Outlook.

All these packages can be found on this month's cover CD.

ments. First, run your email software and find the preference option for the POP mail account settings (see figure 3). This tells your mail program what mail server and mail account to connect to in order to receive your email. Enter the mail server address so your software can find your mail server on the Internet. It usually looks something like mail.telstra.com.au

Figure 3

or pop.telstra.com.au. Next, enter your mailbox ID or username. Finally, fill in your password and verify it.

Often, ISPs have separate servers set aside for sending messages. The SMTP server settings tell the email program

which server to send outgoing messages to. Find the Preference settings for the SMTP server and enter in the SMTP server address supplied by your ISP (see figure 4). This information might be the same as your POP server, depending on your ISP. You can also enter your email address and the name you want to appear in the message header.

Figure 4

Choosing a third-party email program

There are free programs available that provide basic email functions and advanced commercial programs, allow-

ing you to send notes, to-do lists, appointments, contacts and Palm programs. Some of these programs have document views, can attach or import (read) vCards as well as view the header of your emails before downloading them, which allows any junk mail to be left on your mail server. Remember, more functions mean more resources are used.

A typical free email program is about 50K, while the average commercial program is 200K before installing plug-ins. In addition, large attachments can easily fill the memory of a small device. If you only need basic email, then a free-ware program will probably suit you. If you use a corporate email system and have plenty of free memory, then you may want to look at one of the more advanced packages.

Prices for commercial software range from about \$40 to \$75, and you can install free demo versions to see which one best suits your needs. This month's cover CD includes five third-party email programs (see the box above for more details).

Ronald Rosenbaum can be contacted at ron@ats.au.com. For a complete archive of APC PDAs columns, see <http://apcmag.com/pdas/>.

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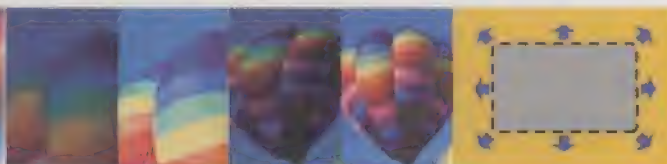
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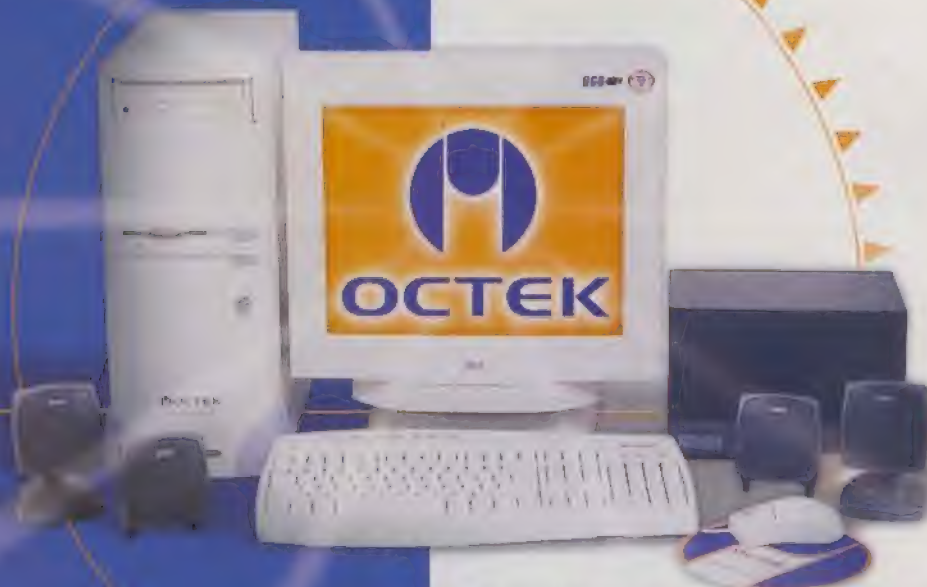
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Let your Mac off the leash using Apple's AirPort wireless networking. By Stephen Withers

Mac OS

Apple's AirPort products have made wireless networking affordable for homes, small businesses and schools, and more accessible in corporate environments. Here we look at setting up AirPort cards, AirPort base stations and compatible 802.11 wireless networking PC Cards in older PowerBooks, and at connecting AirPort-equipped Macs without a base station.

Base station

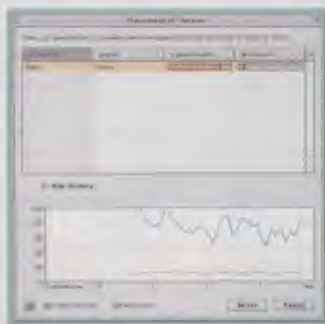
The AirPort base station needs to be located near a power point and, depending on the type of network connection you intend to use, a phone socket or an Ethernet connection. If possible, position the station centrally in the area you want to cover, avoiding sources of interference such as microwave ovens. If it only needs to cover a house, a couple of classrooms or a small area within an office building, you shouldn't have too much trouble. Apple suggests that you locate the base station on a desk or a wall (using the supplied mounting bracket). APC tried putting it under a desk, but found that this severely restricted the range. You can fine-tune the position of the base station using the AirPort Admin Utility. This gives you an indication of the signal strength from the computers in range. Signal strength can be displayed as a graph, which makes it easy to see the effect of moving the base station or the client computers.

If you wish to provide complete coverage over a larger area, you will want to use base stations from another manufacturer — there are numerous suppliers of 802.11 Ethernet hubs. Make sure your budget can cover a professional site survey to determine their optimum location.

After installing the AirPort software on an AirPort-equipped Mac, the AirPort Setup Assistant is automatically launched. This transfers the current Internet setup from the Mac to the base station. If you are using a dialup connection, the only extra information you might need to add is the password. The base station can-

not prompt for this each time it makes a connection, and you probably wouldn't want it to as everyone using the base station would need to know the ISP password. In the AirPort Setup Assistant, go to Internet Access, click the Show Details triangle and make sure the ISP password is present. If not, type it in. It's a good idea to check that the modem country code is set correctly (ie. to Australia) before proceeding.

Once you've set up a network password, it is sensible to create a separate password for the base station itself, even on a home network. This makes it less likely that the settings will be changed accidentally.



After running the AirPort Setup Assistant, it's advisable to make a couple of changes to the default settings. Run the AirPort Admin Utility, and click the Internet tab. Depending on your pattern of usage, your ISP charges and whether the base station's modem is connected to a phone line that's dedicated or shared, you may want to change the 'Disconnect if idle' setting. This parameter can be varied from 10 seconds to 30 minutes. Any setting under five minutes is likely to lead to an excessive phone bill; 30 minutes should be about right for most shared environments, but be guided by your ISP's policies.

You may also want to set the base station to route Ethernet connections. Click the Network tab, and make sure that the 'Also provide IP addresses on Ethernet' box is ticked. This allows any computer on your Ethernet to obtain an IP address and an Internet connection from the base station (see 'Wired connections', over the page).

On the move

To connect a wireless-equipped Mac to the base station, open the AirPort application from the Apple menu. If the status message says "no AirPort network is selected", click the Show Settings arrowhead and pick one from the Choose network menu. You'll have the choice of Computer to Computer (a direct wireless connection bypassing any base stations; more on this below) and whatever base station networks are avail-

able. In a SOHO environment, there will probably be one only, and that's the network controlled by your base station.

If you've set a network-access password, you'll be asked for the password. For those running Mac OS 9, the password dialog gives you the option of adding the AirPort network password to your Keychain. AirPort software includes a Control Strip module that provides a convenient way of turning wireless communication on or off, switching between AirPort networks, and checking signal strength. The latter is indicated by a row of five simulated LEDs. For a numeric indication, turn on 'balloon help' and point to the LEDs.

When using AirPort, avoid pressing the Disconnect button unnecessarily. This doesn't disconnect your computer from the base station; it disconnects the base station from your ISP. If someone is accessing the Internet from another computer on your wireless network, you will disrupt their session too. When we tried this, the base station automatically redialled, adding to the phone bill.

Once the connection to the base station is established, use your Internet applications in the usual way.

Mac-to-Mac connections

When two AirPort-equipped Macs are switched to Computer to Computer mode and AirPort is selected in their AppleTalk control panels, they can communicate as if they were on a conventional LAN. For instance, if you turn on File Sharing on one, it will be visible in the other's Chooser.

It's also possible to set up a wireless IP connection and use Web Sharing or some other software to transfer information. This is especially relevant to cross-platform situations, but we'll address it from an all-Mac perspective. In the TCP/IP control panel, choose Configurations from the File menu, duplicate the AirPort setting and make it active. Change the Configure menu to 'Manually', and type in an IP address. It's a good idea to use an address in the range 192.168.0.x, as this is reserved for private networks. Do the same on the other computer, but make sure the addresses are different. For example, you might use 192.168.0.1 and 192.168.0.2. The AirPort base station's router can

assign a unique address, but if there isn't one, you must do it manually.

Once you've closed TCP/IP, make sure Computer to Computer is selected in the AirPort application on both Macs. Open Web Sharing on one and click the Start button. On the other, launch a Web browser and enter the IP address of the serving computer as if it is a URL. You might see a message saying that the server can't comply with the request. If that happens, try this: go back to the server's Web Sharing control panel, choose Preferences from the File menu and increase the memory allocation.

Wired connections

The AirPort base station includes a 10BaseT port. You can connect it to a single computer using a crossover Cat 5 cable, or to multiple computers via a regular RJ45 cable and a hub or switch.

If you set up the base station to allocate IP addresses on Ethernet, configuring a Mac to use a wired connection is simple. Open the TCP/IP control panel, set Ethernet in the 'Connect via' menu and 'Using DHCP Server' in the Configure menu. Close TCP/IP, launch your browser or other Internet application, and you're in business.

To use a different type of connection such as dialup, simply open TCP/IP, select Configurations from the File menu, activate the appropriate configuration and close TCP/IP.

WaveLAN

Apple's AirPort cards only work with some recent Macintosh computers, but that's not the end of the story. The Orinoco (formerly Lucent) WaveLAN cards come with software

for all supported operating systems. There is a Mac driver in the folder SOFTWARE:ADAPTER:PC_CARD:DRIVERS:MAC that is intended for use with WaveLAN base stations. However, if you are using an AirPort base station, you should install the AirPort software instead. (We did try using the WaveLAN software; it was able to talk to the base station, but full communication wasn't established.)

Apple's AirPort 1.1 software can be installed on a PowerBook G3 fitted with a WaveLAN card, but only if it's running Mac OS 9. If you haven't already upgraded, this could be the incentive.

Once you've run the installer, the AirPort Setup Assistant runs automatically. Either set up the base station as described above, or choose the 'Set up your computer to join an existing wireless network' option. In the following pane, enter the network password (not the administration password) that you set for the base station and click Go Ahead in the final pane.

From here, use the network just as you do with an AirPort card. The only difference is that 'WaveLAN/IEEE' appears in the Connect via menus in place of 'AirPort.'

To use a Windows-based computer with a WaveLAN card, install the WaveLAN software according to the documentation. The only change you'll need to make to the base station configuration is to disable encryption. This is because Apple's software derives the encryption key from the password, whereas Orinoco's expects the key to be entered directly.

Use your PC as a base station

Apart from setting up direct links between two computers, the AirPort 1.1 software

allows you to use an AirPort-equipped computer as a base station. To do this, run the AirPort application and click the Software Base Station button at the bottom of the window. If necessary, click the Start/Stop tab, type the name of your network in the appropriate field and then click the Start button.

Client computers can use the same TCP/IP setup as hardware base stations. The only difference is that users will need to select the appropriate network name in the AirPort application or from the Control Strip.

This approach offers a convenient way to share a high-speed Internet connection between several wireless-equipped computers at low cost. The disadvantages are that it increases the load on that computer, and network services are disrupted if it crashes or is inadvertently switched off.

The software can also provide IP addresses and connectivity to other computers connected via Ethernet. Unless your network includes a router (whether a hardware router or a software implementation running on a Mac or other computer with two Ethernet ports), using this capability is likely to result in a conflict between the DHCP services provided by the ISP and the software base station. The same limitation applies to hardware base stations. Useful information on using routers in this context can be found at <http://www.macintouch.com/airport3.html>.

Stephen Withers can be contacted at swithers@ozemail.com.au. For a complete archive of APC Mac OS columns, see <http://apcmag.com/mac/>.

Mac OS shareware

AutoCat 2.7

AutoCat allows you to catalogue your internal and external volumes. Catalogues can be accessed from your applications' Open and Save dialogs, and using Sherlock.

SoundJam MP Free 2.0.1

This free player-only version of SoundJam MP allows you to trial the full package for 14 days. It can play most sound formats, including streaming MP3 and audio CDs, with enhanced controls.

Font Gander Pro 1.6

View PostScript and TrueType fonts onscreen or in printed sample sheets without installing the fonts in your system. It's ideal for cataloguing large font collections.

Eradicator 1.2.1

Eradicator remedies a Mac OS 9 problem where your startup disk gradually fills with unnecessary and invisible files, because the Finder's invisible Temporary Items folder is not emptied on shutdown.

Synchronize 3.9

This powerful utility lets you synchronise folders between two Macs, or back up specific folders to an external drive.

DarkSide of the Macintosh 5.0.6

This screensaver has flexible controls and can run all AfterDark modules, even under Mac OS 9.

All these packages can be found on this month's cover CD, along with more detailed reviews.

A continuation of last month's investigation of containers. By Michael Smith

Simple C++

To explore the STL containers a little further, let's start with the concept of iterators. When you store any collection of data, it's not uncommon to perform an operation consecutively on each element in the collection. For example, you might want to print out the whole collection, save it to a file, or perhaps scale or modify each element. Using a conventional array, you would normally use a for loop for such a task, as illustrated in listing 1. Some of the STL containers — such as the vector — support array notation using the square brackets ([]), but many do not. A more general way to address every element in a collection is required. The solution is the iterator.



If only it were this simple!

An *iterator* is an object that points to other objects. Unlike a normal pointer, an iterator is dependent upon a collection. For example, an iterator might be defined as `vector<int>::iterator i`; This iterator points to an element in a vector of integers. Incrementing the iterator points it to the next element in the vector. Each of the containers provide the methods `begin()` and `end()`. The `begin()` method returns an iterator which points to the first element in the container, while the `end()` method returns an iterator which is beyond the last element. Listing 2 illustrates the use of an iterator to print the contents of a vector.

In addition to the plain vanilla iterator, the containers also support `const_iterator` and `reverse_iterator`. Where a plain iterator allows you to change the contents of the container, a `const_iterator` does not. This allows certain optimisations, so the `const_iterator` is typically much faster. The

C++ source code

Listing 1

```
void dump( string *arr,
          int num )
{
    int i;
    for (i=0; i<num; i++)
        cout << arr[i] << '\n';
}
```

Listing 2

```
void dump(vector<string> v)
{
    vector<string>::iterator i;
    for ( i=v.begin();
          i!=v.end();
          i++)
        cout << *i << '\n';
}
```

Listing 3

```
#include <iostream>
#include <deque>

using namespace std;

int main()
{
    deque<int> d;

    for (int n=0; n<10; n++)
        d.push_back( n );

    // Double each element
    deque<int>::iterator i;
    for (i=d.begin();
          i!=d.end();
          i++)
        *i *= 2;;

    // Print out list
    cout << "Doubled List\n";
    deque<int>::const_iterator c;
    for (c=d.begin();
          c!=d.end();
          c++)
        cout << *c << '\n';

    // Print in reverse order
    cout<<"\nReversed List\n";
    deque<int>::reverse_iterator r;
```

```
for (r=d.rbegin();
      r!=d.rend();
      r++)
    cout << *r << '\n';

    return 0;
}
```

Listing 4: contain.cpp

```
#include <iostream>
#include <stack>
#include <queue>
using namespace std;

int main()
{
    const int Max = 10;
    int data[Max] =
        { 5, 2, 6, 1, 9,
          4, 0, 7, 3, 6 };

    stack<int> s;
    queue<int> q;
    priority_queue<int> p;

    for (int n=0; n<10; n++) {
        s.push( data[n] );
        q.push( data[n] );
        p.push( data[n] );
    }

    cout << "\n\nPrint stack "
          << "contents\n";
    while (!s.empty()) {
        cout << s.top() << ' ';
        s.pop();
    }

    cout << "\n\nPrint queue "
          << "contents\n";
    while (!q.empty()) {
        cout << q.front() << ' ';
        q.pop();
    }

    cout << "\n\nPrint priority "
          << "queue contents\n";
    while (!p.empty()) {
        cout << p.top() << ' ';
        p.pop();
    }

    cout << '\n';

    return 0;
}
```

These listings can be found on this month's cover CD.

reverse_iterator allows you to move from last to first (instead of first to last). It will normally be initialised using the rbegin() and rend() methods.

Listing 3 shows the use of some different types of iterators, on a deque. You use a normal iterator to modify the data, and you use a const_iterator and reverse_iterator for printing out the contents of the deque.

There are, of course, many more flavours of iterator, but this is Simple C++, so we won't delve too deeply.

Sequence adaptors

You've seen the three standard types of sequences: vector, list and deque. The STL also provides three sequence adaptors: the stack, the queue and the priority_queue. These behave much like normal sequences but they are, in fact, implemented using one of the sequence types. By default, the stack and queue are implemented as deques, while the priority_queue is implemented as a vector; however, it is possible to use other sequences. For example, `stack<int> s1` declares a stack of integers, which uses the default deque implementation.

Alternatively, `stack<int, list<int> > s2` declares a stack which is implemented using a list. The space between the two greater-than characters (>) is important. If it is left out, the compiler reads it as the >> operator and gets seriously confused.

Elements are added to a stack using the push() method. The top element can be accessed using the top() method and removed using the pop() method. In our own CStack class (see APC June, page 146), the pop() method returns the top element as it removes it, but in the STL stack the pop() method simply removes the top element, returning nothing.

The queue behaves much as expected. Instead of a top() method, it has front() and back() methods to access the first and last elements. The push() method places an element at the back of the queue, while the pop element removes an element from the front of the queue.

Listing 4 (contain.cpp) illustrates the use of a stack and a queue of integers.

The priority queue is an interesting case. Where the front() method of a queue returns the element which has been in the queue longest, and the top() method of a stack returns the element

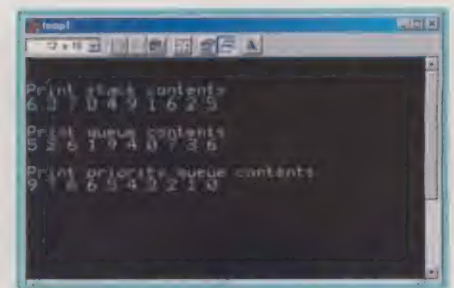


Figure 1

which was most recently added, the top() method for a priority queue returns (by default) the largest element in the queue.

Figure 1 shows the output from the program contain.cpp. Note how the queue outputs the data in the order which it was entered, the stack outputs in reverse order and the priority queue outputs in sorted order.

Next month we'll continue to explore the world of containers by examining the map and the set. Until then, keep on coding!

Michael Smith can be contacted at emmenjay@zip.com.au. For a complete archive of APC Simple C++ columns, see <http://apcmag.com/simplec/>.

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How to load images into your applets to make them more attractive and useful. **By David Williams**

Java

For some time now, readers of this column have been writing Java applets that can be run within a Web browser. This month, you will make your applets even more useful and attractive by loading images that they can display.

Your applet will write a customisable 'hello world' message. You will also enable the user to click the mouse at any point within the applet window to draw a picture.

Hello . . .

To make the 'hello world' message customisable, let the bulk of the message be defined as a parameter called 'who' in the HTML code. Your applet will just write Hello followed by the contents of this parameter.

In the code, use the applet's `getParameter()` method to retrieve the value passed in, and place this in the string variable `who`. This happens in the `init()` method, which is executed automatically when an applet is invoked.

If there is no `PARAM` tag in the HTML file that defines the `who` parameter, then `getParameter()` will return a null value, which is a special constant that indicates an undefined value. In this case, the next line in your `init()` method predictably assigns the word 'world' to the `who` variable. You should always be sure to test any important parameters and assign sensible defaults to them, because there is no guarantee that your applet will be called with values for all possible parameters.

The next part of `init()` does something new. You call a method called `getDocumentBase()`, which returns an object of type `java.net.URL`. For this reason, you import `java.net.*` at the beginning of the program. `getDocumentBase()` returns the full URL of the applet, up to the directory name. In this way, the applet can then load other files that are stored with it. Let's take an image, for example.

You've allowed the image to be specified as a parameter, so you need to call `getParameter()` again. As usual, you need to test if the parameter has been assigned a value. If it has, you can call a handy method provided by the applet called `getImage()`. This method takes two pa-



Sample image



A sample run of the applet, running in Internet Explorer



A sample run of the applet, running in Sun's AppletViewer

rameters: a base URL and the image filename. These are joined together to give the full URL for the image. As you will store the image in the same directory as your applet on either your hard disk or a Web server, the base URL of the image is the same base URL as that of the applet.

The Java image object

Just as Java provides a `java.awt.Button` object to represent clickable buttons, it also provides a `java.awt.Image` object to hold images. `getImage()` returns an object of type `java.awt.Image`. This is another Java feature new to readers. Using `getImage()` will load a picture into the `Image` object for later display.

In your `init()` method, you then move on to formatting the 'hello world' message. Make a string that consists of hello followed by whatever was specified in the `who` parameter (this will be world if that parameter was omitted). Next, since you have retrieved the base URL in order to load the image, make a second string to display this. The `URL` object has a `toString()` method which returns a simple string representation of the URL.

As you wish to respond to mouse events, you need to do two things. First, you need to register that you want your applet to respond to mouse events, just as you have done every other time you handled events like button clicks or mouse movements. Second, you need to write the event handler code for mouse events. The first part is easy: you just call `addMouseListener` at the end of your `init()` method. This tells the applet that mouse events should be acknowledged and will be processed by your class.

To write the event handler, your class must implement the `MouseListener` interface. You then write a `processMouseEvent()` method where you save the X and Y coordinates of the button click, and set a flag called `doing` to say that the image should be drawn on the screen. Finally, the event handler uses `repaint()` to tell the applet to refresh its screen (because you have clicked the mouse at a specific coordinate, and want your picture to appear at this coordinate).

Your applet must define code for all the other methods defined by the

Java source code

Listing 1: hello.java class

```
import java.applet.*;
import java.awt.*;
import java.awt.event.*;
import java.net.*;

public class hello extends Applet
{
    implements MouseListener

    private int drawX, drawY;
    String msg1;
    String msg2;
    String imgnam = null;
    Image img;
    boolean doimg = false;

    public void init ()
    {
        String who;
        String where;
        URL uwhere;

        who = getParameter ("who");
        if (who == null)
            who = "world";

        uwhere = getDocumentBase ();
        imgnam = getParameter ("image");
        if (imgnam != null)
            img = getImage (uwhere, imgnam);

        where = uwhere.toString ();
        msg1 = "Hello, " + who + ", ";

```

```
        msg2 = "from " + where;

        addMouseListener (this);
    }

    public void processMouseEvent
    (MouseEvent e)
    {
        if (e.getID () ==
        MouseEvent.MOUSE_PRESSED)
        {
            doimg = true;
            drawX = e.getX ();
            drawY = e.getY ();
            repaint ();
        }

        public void mouseReleased
        (MouseEvent e) {}
        public void mousePressed
        (MouseEvent e) {}
        public void mouseClicked
        (MouseEvent e) {}
        public void mouseEntered
        (MouseEvent e) {}
        public void mouseExited
        (MouseEvent e) {}

        public void paint (Graphics g)
        {
            Dimension d = getSize ();

            g.drawRect (0, 0, d.width -
            1, d.height - 1);
            g.setColor (Color.blue);
            g.drawString (msg1, 10, 15);

```

```
            g.drawString (msg2, 10, 30);
            g.drawString ("Click anywhere
            to see mouse event handling", 10,
            45);

            if (doimg == true && imgnam
            != null)
            {
                g.drawImage (img, drawX,
                drawY, this);
                g.setColor (Color.red);
                g.drawString ("Squeak!",
                drawX, drawY + 10 + img.getHeight
                (this));
            }
        }
    }
}
```

Listing 2: hello.html

```
<html><head>
<title>Hello world</title>
</head><body>
<applet code="hello.class"
width="400" height="400">
    <param name="who" value="APC
reader!">
    <param name="image"
value="lilgirls.gif">
</applet>
</body></html>
```

These listings can be found on this month's cover CD.

MouseListener interface, namely mouseReleased() through mouseExited(). However, because you are not interested in responding to these events in this applet, you can leave their implementation empty.

Finally, you encounter the paint() method. Remember that the paint() method, like init(), is defined by the java.applet.Applet class (from which your applet is derived) and is called automatically, whenever it is needed. This includes when the window first appears on the screen, or when the applet window has been partially or completely occluded by another window which then moves away. You can also force a call to the paint() method explicitly by using the applet's repaint() method as you would in your mouse event handler.

paint() is called with a graphics context g as its argument. You can now use a number of methods in the Graphics class to alter the drawing area. You begin by determining the current size of the applet's drawing area via a call to getSize(). This method returns a Dimension object which has height and width properties. You then use the drawRect method of the Graphics class to draw a blank rectangle covering the entire drawing area — which is a quick-and-dirty way to clear your drawing area so you don't ghost your images as you move the mouse around.

Next, set the text colour to blue and print your two greeting strings, followed by an invitation to the user to click anywhere. If the class variable doimg is true and the class variable imgnam is not null,

then the image retrieved during the init() method will be displayed, followed by the message Squeak! in red.

The method call img.getHeight(this) returns the height of the image. This is used in the calculation of the y coordinate of the message (Squeak!) string, so that it will appear just below the image you have drawn.

You can now enhance this applet using the things you've learned over previous months. You might want to merge the scribble applet with this one, so that pictures can be loaded and then drawn over with pen colours selectable from a menu.

David Williams can be contacted at dave@qed.newcastle.edu.au. For a complete archive of APC Java columns, see <http://apcmag.com/java/>.

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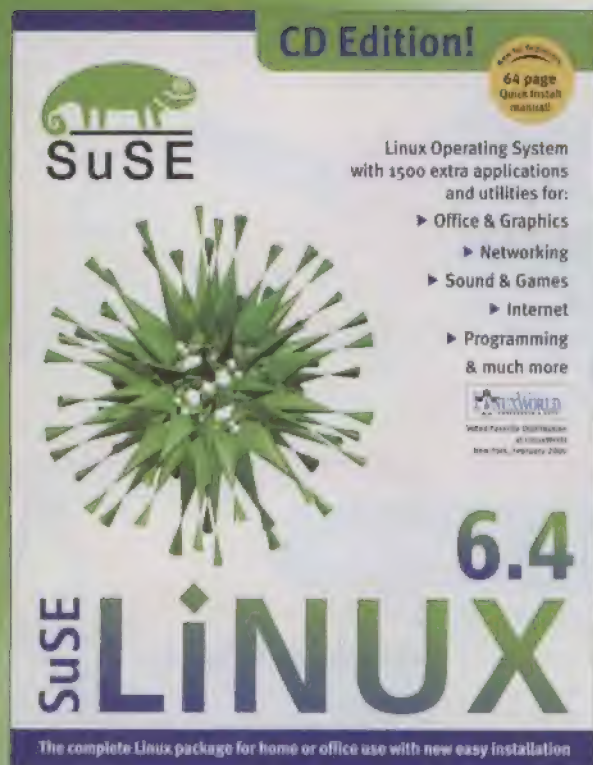
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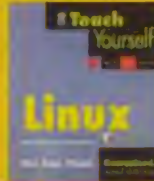


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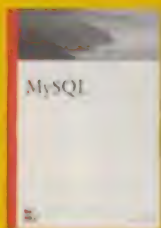
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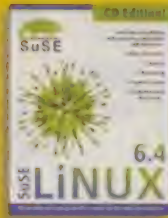
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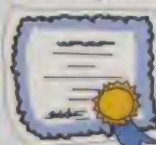
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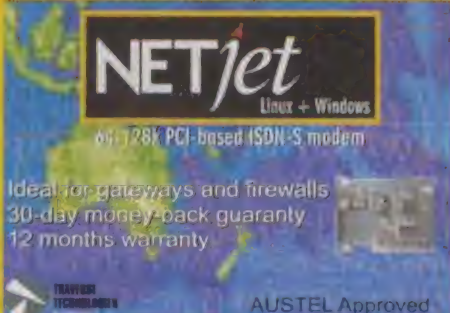


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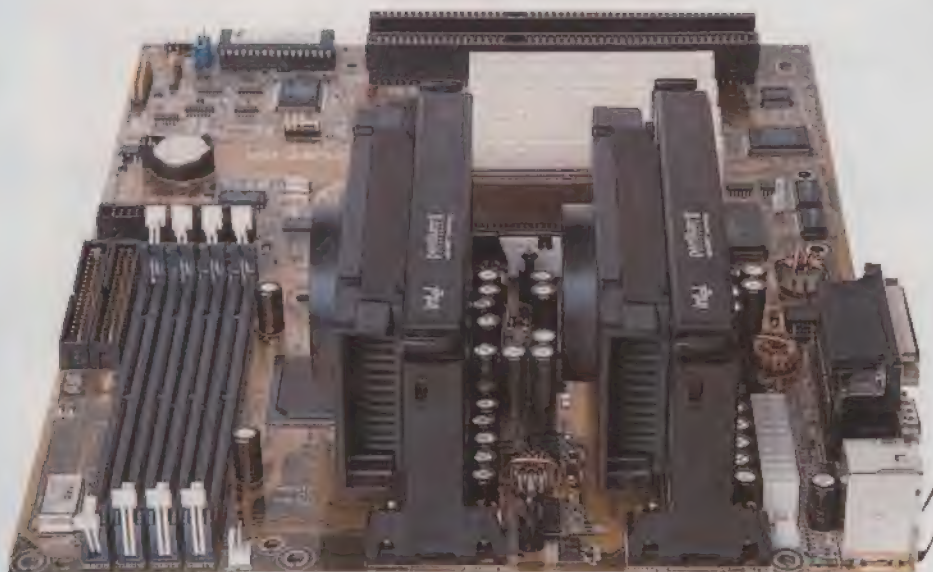
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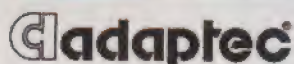
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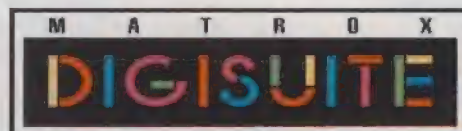
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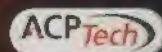
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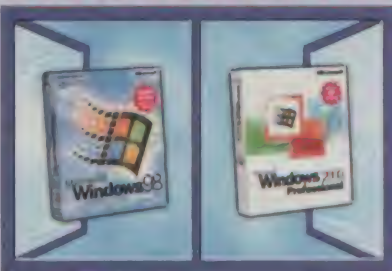
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MS Windows 98 Refresh Second Edition Upgrade	149	165
MS Works Suite 2000	169	185
MYOB Accounting (Win/Mac) (GST Rebate Applies)	325	358
MYOB Accounting Plus (Win/Mac) (GST Rebate Applies)	475	522
MYOB Premier - 3 Users (GST Rebate Applies)	865	950
MYOB Retail Manager 4.0.1 (New Digi-Till)	889	975
Nero Burning Rom 4.0	98	108
Net Nanny Internet Censor 3.1	45	50
Norton Ghost 5.1 Personal Edition	115	127
Norton Internet Security 2000 & CleanSweep 2000	89	98
Norton PC Anywhere 9.2 H&R	199	219
Norton SystemWorks 2000 PRO	159	175
OmniPage Pro 10 Crossgrade/Upgrade (Soft Pack)	189	205
Paint Shop Pro 6.02	165	182
Phonedisc - Australian	89	98
PowerQuest Lost & Found	99	109
PowerQuest Partition Magic 5.0	109	120
QuarkXPress 4.1 (Win/Mac)	2,395	2,635
QuickBooks 7.1 & QuickPayroll	389	428
QuickBooks 7.1 PRO Upgrade	149	165
Quicken 7.0 Personal Plus	89	98
Quicken 7.0 Cashbook	135	149
Retrospect Express	119	130
STEX Charting System 6.0	179	195
SubmitWolf Pro	138	152
Tracker Maximizer 5.0	285	312
TurboLinux Server 6.0	349	382
TurboLinux Workstation 6.0	49	54
VET Net Surfer/Premium	79/89	87/98
WebTrends Professional	1,295	1,425
Winfax Pro 10	125	138
WinZip 7.0 1 User	65	72

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(Student/Teacher ID Required)

	Pre-GST	Inc GST
ED 3D Studio Max 3.0 + Character Studio 2.0 (School Version)	549	598
ED Adobe Acrobat 4.0	189	208
ED Adobe Illustrator 9.0	259	285
ED Adobe InDesign 1.5	545	598
ED Adobe PageMaker 6.5 PLUS	439	482
ED Adobe Photoshop 5.5	465	512
ED Adobe Premiere 5.1	565	622
ED AutoCAD 2000	245	269
ED AutoCAD Architectural Desktop (Student Version)	245	269
ED AutoCAD Mechanical Desktop (Student Version)	245	269
ED AutoCAD LT 2000	245	269
ED Borland C++ Builder 5.0 PRO	185	202
ED Borland Delphi 5.0 PRO	179	195
ED Corel Draw 9.0	189	208
ED Corel WordPerfect 2000	99	109
ED Filemaker Pro 5.0	285	312
ED iGrafx Professional (New Flowchart)	245	269
ED Lotus SmartSuite Millennium 9.5	137	149
ED Macromedia Courseware Builder for Dreamweaver	135	149
ED Macromedia Director Studio 8.0	1,155	1,269
ED Macromedia Dreamweaver 3.0	195	215
ED Macromedia Drumbeat 2000 e-Commerce	189	208
ED Macromedia Flash 4.0	175	192
ED Macromedia Web Design Studio	379	415
ED Microsoft Academic Tides	CALL	CALL
ED Norton AntiVirus 2000	58	64
ED Norton PC Anywhere 32 9.2 H&R	149	165
ED Norton SystemWorks 2000	95	105
ED Partition Magic 5.0	62	68
ED PowerQuest Lost & Found	49	55
ED Winfax Pro 10	70	76

HARDWARE/PERIPHERALS

	Pre-GST	Inc GST
3Com Palm Vx Connected Organizer	745	692
Banksia EastHill 56	179	170
Banksia Wave SPII V90 & 56 FLEX	179	172
Click! Drive PC Card	262	255
HP CD-Writer Plus 9310i IDE (4x10x32x)	565	525
HP DeskJet 880C Printer	365	339
HP LaserJet 1100 Printer	802	748
HP OfficeJet T45 Print/Fax/Scan/Copy	850	779
HP ScanJet 5300C (Parallel/USB)	532	496
HP ScanJet 4350C & Omnisage Pro 10 Upgrade	1,135	1,129
Imation SuperDisk 120MB USB Drive	322	310
Imation Travan NS 20GB (TR-5) - 5 Pack	275	255
Imation CDR ZipCD 4X4X6 External USB Burner	538	518
Jaz Drive 2GB SCSI External	638	595
Leoptics 17" Colour Monitor	418	388
Logitech Cordless Desktop iTouch Keyboard & Mouse	192	189
Logitech Quickcam Express	89	85
Logitech QuickCam Pro Parallel	269	259
Magic Touch Screen (13" to 15" monitors)	428	395
MS IntelliMouse PS2/USB with IntelliEye	68	72
Mustek gSmart 350 USB Digital Camera	285	275
Netcomm Roadster II 56 USB	218	209
Netcomm Roadster Ultra II 56K SVD	218	209
Olympic USB Scanner (48 Bit Colour)	185	188
Plantronics SR1 Multimedia Mono Headset & Mic	59	55
Swann Message Pro Modem/Digital Ans.Machine V90	275	272
SwannSmart Modem 56K V90 External Voice/Fax/Data	179	179
US Robotic 56K V90 Fax/Data External Modem	189	179
Zip Drive 250MB Parallel/SCSI External	289	275
Zip Drive 250MB USB External	345	332
Zip Drive Starter Kit + 4 Disks	242	229

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CC-2BK	BJI-201BK	BJC-600/610/620 Black	\$6.00
CC-3BK	BJI-643BK	BJC-800/820 Black	\$12.00
CC-4BK	BCI-21	BJC-2000/4000/5000 Series Black	\$7.00
CC-5CL	BCI-21C	BJC-2000/4000/5000 Series 3-Colour	\$12.00
CC-6BKHC	BJI-201BK HC	BJC-600/610/620 Hi-Cap Black (14ML)	\$9.00
CC-7BK	BCI-10	BJ-30 Black	\$9.00
CC-8BK	BCI-11	BJC-70 Black	\$9.00
CC-9CL	BCI-11C	BJC-70 3-Colour	\$17.00
CC-11CL	BCI-61	BJC-7000 Series 3-Colour	\$32.00
CC-12PCL	BCI-62 PHOTO	BJC-7000 Series Photo 6-Colour	\$38.00
CC-13B	BCI-3	BJC-6000 Black	\$25.00
CC-14C	BCI-3C	BJC-6000 Cyan	\$16.00
CC-15M	BCI-3M	BJC-6000 Magenta	\$16.00
CC-16Y	BCI-3Y	BJC-6000 Yellow	\$16.00
CC-17PBK	BCI-3PBK	BJC-6000 Photo Black	\$18.00
CC-18PC	BCI-3PC	BJC-6000 Photo Cyan	\$18.00
CC-19PM	BCI-3PM	BJC-6000 Photo Magenta	\$18.00

EPSON COMPATIBLE

Code	OEM Equivalent	Compatible With:	Price
CE-51BK	SO20025	STYLUS 800/1000 Black	\$16.00
CE-52BK	SO20034	STYLUS Colour/Colour Pro Black	\$20.00
CE-53CL	SO20028	STYLUS Colour/Colour Pro 3-Colour	\$30.00
CE-54BK	SO20047	STYLUS 200/820/Colour II /IIs Black	\$13.00
CE-55CL	SO20049	STYLUS 200/820/Colour II /IIs 3-Colour	\$21.00
CE-56PBK	SO20093	STYLUS Colour 400/500/600/Photo Black	\$17.00
CE-57CL	SO20097	STYLUS Colour 200/500 3-Colour	\$23.00
CE-58BK	SO20108	STYLUS Colour 800/850/1520 Black	\$17.00
CE-59CL	SO20089	STYLUS Colour 400/600/800/1520 3-Colour	\$23.00
CE-60PCL	SO20110	STYLUS Colour 700/Photo/Photo 700 5-Colour	\$26.00
CE-61BKCL	SO20138	STYLUS Colour 300 4-Colour	\$31.00
CE-65BK	SO20187	STYLUS Colour 440/640/660 Black	\$16.00
CE-66BK	SO20189	STYLUS Colour 740/760 Black	\$16.00
CE-67CL	SO20191	STYLUS Colour 440/640/660/740/760 3-Colour	\$26.00
CE-68PCL	SO20193	STYLUS Photo 750 5-Colour	\$33.00



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PAPER FROM ONLY 13 CENTS PER SHEET

Code	Description	Sheets	Price	Price per Sheet
A4CP	A4 90gsm Coated Paper	200	\$ 25.00	0.13
A3CP	A3 90gsm Coated Paper	100	\$ 26.00	0.26
A4HRP	A4 90gsm Hi-Res Paper	100	\$ 15.00	0.15
A3HRP	A3 90gsm Hi-Res Paper	100	\$ 30.00	0.30
A4WF	A4 White Film 100mu	50	\$ 47.00	0.94
A3WF	A3 White Film 100mu	50	\$ 90.00	1.80
A4CF	A4 Clear Film 100mu	50	\$ 39.00	0.78
A3CF	A3 Clear Film 100mu	50	\$ 71.00	1.42
A4FGP	A4 Full Gloss Photo Paper	50	\$ 44.00	0.88
A3FGP	A3 Full Gloss Photo Paper	50	\$ 79.00	1.58
A4PH	A4 Economy Photo Paper	50	\$ 23.00	0.46
AC2	Artists Canvas	25	\$ 60.00	2.40
GC4F	Greeting Card (4 Fold)	100	\$ 28.00	0.28
GCBF	Greeting Card (Bi-Fold)	100	\$ 48.00	0.48
DCCS	Double Coated Card Stock	50	\$ 24.00	0.48
GCS	Glossy Card Stock	50	\$ 24.00	0.48
TTP	T-Shirt Transfer Paper	25	\$ 35.00	1.40
CTP2	Ceramic Transfer Paper	25	\$ 80.00	3.20
MP	Magnetic Paper	25	\$ 58.00	2.32
BC1	Business Cards (10 per A4)	20	\$ 19.00	0.95



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CANON BC-01/02 BJ-10E/20/BJ-200/BJC-210/210SP/240/255
CANON BJ-300/ 330
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20
CANON BJC-3000/6000/6500
HP Desk Jet 400/500 Series
HP Desk Jet 600/660/690 Series
HP Desk Jet 700/850C/855C/870C/890C/1000C Series
HP Deskjet 300 Series & Olivetti JP's!
EPSON Stylus Colour 400/800/800+/1000
EPSON Stylus Colour /PRO/XL
EPSON Stylus 820/colour II/III
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/640/660/700/740/760/900
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series
IBM/LEXMARK 5000/5700/7000 & Z Series
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!

No. of Refills

Kit Code

60 21-BKL
9 3-BKL
7 4-BKL
16 5-BKL
45 19-BKL
9 18-BKL
6 46-BKL
6 8A-BKL
6 8B-BKL
6 29-BKL
8 7-BKL
8 1-BKL
8 2-BKL
12 23-BKL
12 33A-BKL
12 33B-BKL
6 35A-BKL
6 35B-BKL
12 Please Call!



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CANON BJC-210/210SP/240/255
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-3000/6000/6500
HP Colour Desk Jet 300/400/500 Series & Olivetti
HP Colour Desk Jet 600C/660C/690C Series
HP Desk Jet 850C/855C/870C/1000C Series
HP Desk Jet 710/720/890 Series
EPSON Stylus Colour /PRO/XL
EPSON Stylus 820/colour II/III
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/640/660/700/740/760/900
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No. of Refills

Kit Code

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3x12 25-CLR
3x8 10-CLR
3x30 17-CLR
3x4 47-CLR
3x12 14A-CLR
3x12 14B-CLR
3x3 30A-CLR
3x3 30B-CLR
3x4 16-CLR
3x12 24-CLR
3x12 34A-CLR
3x12 34B-CLR
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3x6 36B-CLR
12/Colour Please Call!

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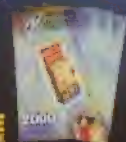
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- 10/100 Integrated Network Card
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with 15" TFT
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- 2 Button PS/2 Mouse
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PRICE	Cel-500	\$1020
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	PIII-700	\$1940
	PIII-750	\$2000
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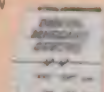
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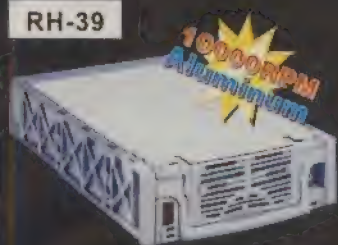
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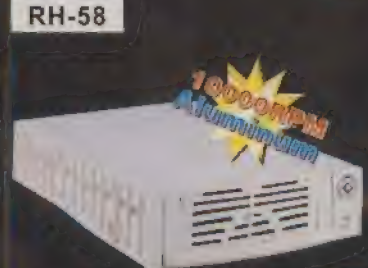
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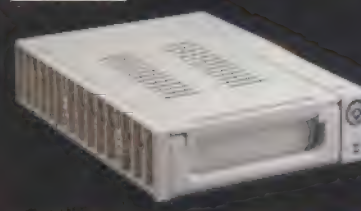
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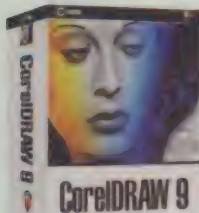
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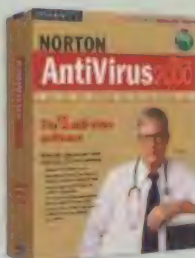
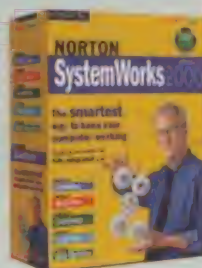
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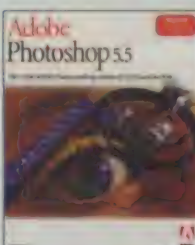
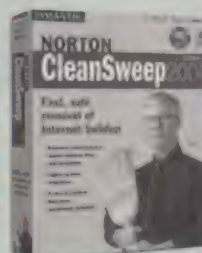
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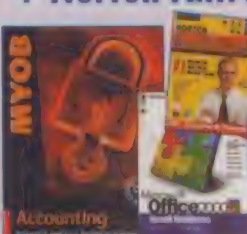
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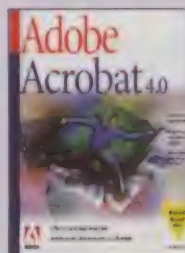


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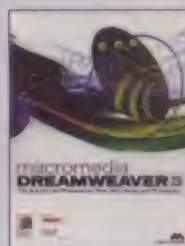
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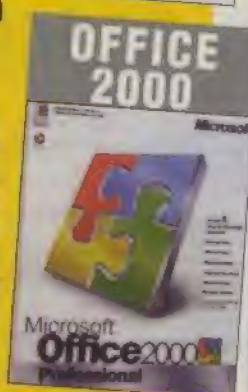
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 7
 16
 45
 9
 6
 6
 6
 6
 8
 8
 12
 12
 12
 6
 6
 12

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 EPSON Stylus Colour 200/300/400/500/600/800/850/1520
 EPSON Stylus Colour 440/460/640/660/700/740/760/900
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 3x6
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 17-CLR
 47-CLR
 14A-CLR
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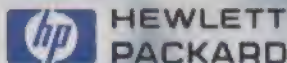
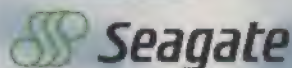
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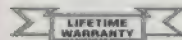
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K3BK	6	K22CLR	8
K3BK	6	K11CLR	8
K1BK	6/9	K9CLR	12
		K25CLR	8
K7BK	00	K11CLR	30
K8BK	7	K2CLR	12
K4BK	9	K2CLR	12
		K23CLR	8
K9BK	7	K3CLR	8
K10BK	16	K4CLR	4
K11BK	12	K5CLR	30
K12BK	0/50	K5CLR	30
K12BK	9	K5CLR	30
K27BK	9	K5CLR	30
K28BK	12	K35CLR	6
		K36CLR	6
K19BK	2	K24CLR	6
		K15CLR	6
K13BK	12	K20CLR	6/12
K16BK	12	K7CLR	6/12
K14BK	12	K6CLR	12
K15BK	8	K6CLR	12
K17BK	12	K20CLR	6/12
K17BK	12	K8CLR	6
K17BK	12	K17CLR	6/12
K21BK	3	K34CLR	3
K26BK	12	K16CLR	6/12
K6BK	12	K16CLR	6/12
K6BK	12	K35CLR	6
		K33CLR	30/12
K18BK	6	K13CLR	12
K24BK	6	K13CLR	12
		K29CLR	12
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K26BK	8	K19CLR	12

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14103-4	Design-A-Mag - FRIDGE MAGNET	A4	3	\$19.90
14210-9	CD Labels (Starter Kit) software and 2 samples of each label	6.25 x 11	10	\$35.00
13208-2	CD Labels (Fun Kit)	6.25 x 11	8	\$25.00
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13910-2	CD Labels (Galaxy Refill)	6.25 x 11	10	\$25.00
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Epson EPS S020062	\$24.00 *
Epson EPS S020036	\$22.00 *
Epson EPS S020049	\$21.00 *
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CANON BJ3070/80 BCI-10/11 BK	30/80	C10
CANON BJ10/BJ200/BJ210/BJ210sp/BJ255sp	7	C2/C2A
CANON BJC600/610/620	15	C5
CANON BJC4000/4100/4200/4550 BCI-21/20	50/8	C8
CANON BJC 6000	4	C19
CANON BJC 7000	12	C15
HP DESKJET 400, 500 & 600 SERIES	7	H2/H14
HP DESKJET 820C/850C/855C/870C/1000C	6	H6
HP DESKJET 720/890/Officejet 1150	6	H13
HP DESKJET 1200 B.Y.C.M	6	H8
EPSON STYLUS COLOUR 750/900/1200	12	E#
EPSON STYLUS 400/800/1000	8	E1
EPSON STYLUS COLOUR / PRO / XL	6	E2
EPSON STYLUS 820 / COLOUR 1111/1520	12	E4
EPSON COLOUR 400/500/600/700/Photo Ex	12	E7
EPSON COLOUR 440/640/740/800/850/1520	12	E7
EPSON STYLUS COLOUR 750/900/1200	12	E14
IBM 4076 LEXMARK	6	M1
OLIVETTI	8	H1
XEROX 4004/CITOH C1300	6	M3

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CANON BJC700/80	60	C11
CANON BJC210/BJC210sp/BJC255sp	10	C3
CANON BJC600/610/620	8	C6
CANON BJC4000/4100/4200/4550 BCI-21	30	C9
CANON BJC 7000	6	C16
HP DESKJET 400, 500 & 600 SERIES	12	H3/H15
HP DESKJET 820C/850C/855C/870C/1000C	6	H7
HP DESKJET 720/890/Officejet 1150	4	H14
EPSON STYLUS COLOUR / PRO / XL	6	E3
EPSON STYLUS 820/COLOUR/1111/1520	12	E5
EPSON COLOUR 200/400/500/600/800/1520	12	EX/E9
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IBM 4076/Lexmark	6	M2

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Canon/Apple 230 Series	BC-01/02	3	278B
Canon 210SP	BC03/BX03	3	27CB
Canon BJ-300/330	BJI-642	2	268B
Canon BJC-600 Series	BJC-201	6	258B
Canon/Apple BJC-4000/5500	BCI-218	15	078B
Canon/Apple BJC-4000/5500	BC-20	3	048B
Canon BJC-7000 & Optimiser	BC-60	2	528B
HP Deskjet 400/500 Series	51626A/33M	2/3	168B
HP Deskjet 600 Series	51629A	2	148B
HP Deskjet 800 Series/1600c	51645A	2	128B
Epson Stylus 400/800/1000 (1st ref.)	S020025	6	238B
Epson Stylus Colour/Pro/XL	S020034/52	4/2	228B
Epson Stylus Colour 820/11/11s	S020047	4	208B
Epson Colour 400/500/600	S020093	6	188B
Epson Colour 800/1520	S020108	4	168B
IBM 4076 Lexmark 1000/1020/2070 Black	C1300	3	098B
Xerox 4004 C-ITCCH	C1300	3	488B

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DESCRIPTION	CARTRIDGE	No./fill	CODE
Canon/Apple 210/240	BC-05	3x10	100X
Canon BJC-600 Series	BJC-201	3x10	240X
Canon/Apple BJC-4000/5500 Series	BCI-21C	3x30	060X
Canon BJC-7000	BCI-61	3x4	510X
HP Deskjet 400/500 Series	51625A	3x10	150X
HP Deskjet 600 Series	51649A	3x10	130X
HP Deskjet 800 Series/1600c	51641A	3x6	110X
Epson Stylus 200/500	S020097	3x10	190X
Epson Stylus Colour/Pro/XL	S020036/66	3x8/2	210X
Epson Stylus 820/11/11s	S020049	3x10	190X
Epson Stylus 400/600/800/1520	S020089	3x10	170X
IBM 4076 Lexmark 1000/1020/2070 Colour	C1300	3x6	340X

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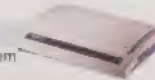
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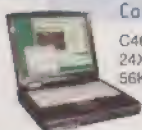


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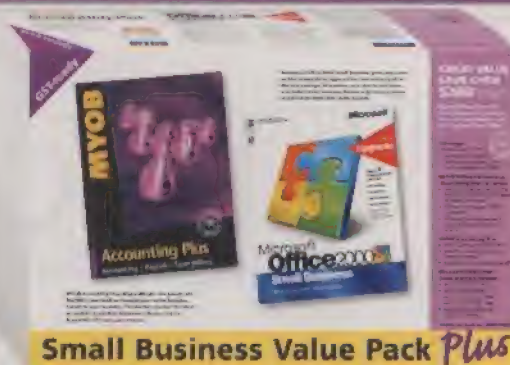


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Hard Disk	4GB	6GB	6GB
Screen	12.1" TFT	12.1" TFT	14.1" TFT
CD-ROM	Yes	Yes	Yes
Mic & Spkr	Yes	Yes	Yes
Port replicator	No	No	No
Select bay	No	No	No
DVD capable	No	Inc 4xDVD	Inc 4xDVD
Weight	3.1 kg	3 kg	3.1 kg
Warranty	1 Year	1 Year	1 Year
DAA modem	Yes	Yes	Yes
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Mic & Spkr	Speakers	Speakers	Speakers
Port replicator	Optional	Optional	Optional
Select bay	Yes	Yes	Yes
DVD capable	Capable	6 x DVD	6 x DVD
Weight	2.8 kg	2.8 kg	2.8 kg
Warranty	3 Years	3 Years	3 Years
DAA modem	Yes	Yes	Yes
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	Portégé 3440CT	Portégé 7200CT
Processor	Pentium III 500MHz SS*	Pentium III 600MHz SS*
RAM Std/Max	64/192 MB	64/320 MB
Hard Disk	6GB	12GB
Screen	11.3" TFT	13.3" TFT
Display	1024 x768	1024 x768
CD-ROM	Optional	Optional
Mic & Spkr	Yes	Yes
Port replicator	Multi-media	Optional
Select bay	Optional	No
DVD capable	Yes	Yes
Weight	1.6 kg	1.9 kg
Warranty	3 Years	3 Years
DAA modem	Yes	Yes
GST Ex + GST	\$4,102 + \$410.20	\$5,703 + \$570.30
GST INC	\$4,512⁻²⁰	\$6,273⁻³⁰
With Windows 95/98	(99762)	(94170)
GST Ex + GST		\$5,849 + \$584.90
GST INC		\$6,433⁻⁹⁰
With Windows 2000		(94171)

Portégé 7200CT

Portege 7200CT offers Intel®'s powerful Mobile Pentium® III 600MHz processor with Intel

SpeedStep™

technology to speed through applications.

At 25mm thin and only 2kg, Portege 7200CT packs unprecedented power into its slender charcoal grey and silver magnesium alloy case.



*SS = Speed Step

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Toshiba Install Options

For a small extra charge we can install your chosen options into your new Toshiba: a modem, more information.

*** Rental Figures** quoted are for business use, includes stamp duty and FID for NSW, to approved purchases. Rental price quoted include GST

Options for Toshiba Notebooks

For more options see Web Direct Link

TOSHIBA EDO Memory Upgrades

32MB for Tecra 8000 (not for PIII models)/

Portégé7000/Satellite 4000

GST Ex \$186 + GST \$18.60 (29356) GST INC **\$204.60**

32MB for Portégé 3110

GST Ex \$174 + GST \$17.40 (81078) GST INC **\$191.40**

64MB for Tecra 8000 (not for PIII models)/

Portege7000/Satellite4000

GST Ex \$346 + GST \$34.60 (29348) GST INC **\$380.60**

64MB for Portégé 3020

GST Ex \$362 + GST \$36.20 (77229) GST INC **\$398.20**

TOSHIBA Battery Packs

For Satellite 4000/4010/2520CDT & others

GST Ex \$108 + GST \$10.80 (21930) GST INC **\$118.80**

For Portégé 3010/3020 (Lithium Ion)

GST Ex \$124 + GST \$12.40 (73665) GST INC **\$136.40**

For Satellite 4000 Series

GST Ex \$108 + GST \$10.80 (72109) GST INC **\$118.80**

For Tecra 8000 (Lithium Ion)

GST Ex \$235 + GST \$23.50 (29358) GST INC **\$258.50**

TOSHIBA High Capacity Battery Packs

For Portégé 3010/3020

GST Ex \$235 + GST \$23.50 (72475) GST INC **\$258.50**

For Portégé 7000/7020

GST Ex \$269 + GST \$26.90 (66479) GST INC **\$295.50**

TOSHIBA Battery Charger

For Tecra 8000

GST Ex \$366 + GST \$36.60 (29357) GST INC **\$402.60**

TOSHIBA Universal AC Adapter

For Tecra 8000/Satellite 4000/4010 & others

GST Ex \$110 + GST \$11.00 (44200) GST INC **\$121.00**

TOSHIBA Additional 2 Year Warranty

For Satellites with TFT Display

GST Ex \$182 + GST \$18.20 (21729) GST INC **\$200.20**

TOSHIBA Port Replicators

For Tecra II 750/780/8000

GST Ex \$610 + GST \$61.00 (79226) GST INC **\$671.00**

TOSHIBA Desk Station V+

For Tecra 500/550/650/700/750/8000 Series

GST Ex \$1,138 + GST \$113.80 (25446) GST INC **\$1,251.80**

TOSHIBA Carry Bags

Toshiba Friend Carry Bag

GST Ex \$67 + GST \$6.70 (75901) GST INC **\$73.70**

Leather Bag for A4 Notebooks

GST Ex \$174 + GST \$17.40 (68408) GST INC **\$191.40**



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E-mail: sales@ht.com.au

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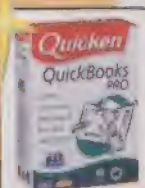
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QuickBooks

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GST INC

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Intel Pentium
III 550

17" Monitor

8.4Gb HDD

*3 Yr Warranty

** RentSmart rates are higher when Equipment value is less than \$2,000. T.A.P. based on 3 year term.

\$\$\$

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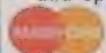
Processor	Intel Pentium III 550
RAM	64MB SD RAM upgradeable to 256MB
Sound	Integrated 16bit multimedia
Drive	1.44mb Diskette Drive
Keyboard	Enhanced keyboard
	DMI 2.0 Compliant
Expand	Expandability through 3 PCI slots, 2 bays.
*Warranty	Compaq 3 year parts, 1 year labor, 1 year on-site limited warranty.
Hard Disk	8.4gb Hard Drive.
Monitor	17" Monitor
CD ROM	48x Speed CD- Rom
Part #	(A1402)
Rent 3 Yrs**	\$Call
GST Ex+GST	\$1,699 + \$169.90
GST INC	\$1,868.90

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WIN98	✓
WIN2000	✓
NT	✗
WIN95	✗

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Armada V300



Armada E500



Armada M700

	V300	E500	M700
Processor	C500MHz	PIII600MHz	PIII500MHz
RAM	64MB	64MB	64MB
Hard Disk	6GB	12GB	12GB
Screen	14.1" TFT	14.1" CTFT	14.1" TFT
Display	1024 x 768	1024 x 768	1024 x 768
CD-Rom	24x max	24x max	Optional
Battery Life	up to 3 hrs	up to 3 hrs	up to 3 hrs
DVD	Optional	Optional	4xDVD-Rom
Modem	56K	56K	56K & 10/100NIC
Warranty	1 year	1 year	3 years
Op System	Win 95/98	Win 95/98	Win 95/98
Rent 3 Yrs	SCall	SCall	SCall
Part Number	(99901)	(99722)	(89024)
GST Ex	\$3,381	\$4,263	\$4,997
+GST	\$338.10	\$426.30	\$499.70
= GST INC	\$3,719.¹⁰	\$4,689.³⁰	\$5,496.⁷⁰

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- Easy to set up, easy to maintain
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- Local and Internet email
- High Speed internet access port
- Intel Celeron 500MHz
- 64MB memory
- 56K v.90 modem
- 8 port hub
- Built-in secure firewall
- 100 user license
- Grows with your business

GST Ex \$2,633 + GST \$263.30
(A0268) GST INC

\$2,896.³⁰



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The result of a development partnership of Acer Computer Australia & Acer Digital Services Australia with LookSmart, BizWorks, JFAX, & Presence Online, BizSmart is a 'one-stop-shop' for the latest business, e-commerce, & communication tools, information & services.

AcerPower S Series



Includes Acer 15" CRT monitor, Speakers, integrated UMA 8MB VGA (AcerPower Se) / 8MB ATI RagePro TURBO 3D graphics accelerator (AcerPower Sn) 16-bit sound, Microtower, PC-Cillin anti-virus

	AcerPower Se		AcerPower Sn		
CPU	Celeron	Celeron	Pentium III	Pentium III	Pentium III
	566MHz	600MHz	650MHz	700MHz	750MHz
RAM	64MB	64MB	64MB	64MB	128MB
HDD	5GB	10GB	10GB	10GB	15GB
CD/DVD	CD/LAN	CD/LAN	CD/LAN	CD/LAN	CD/LAN
OS	W98SE	W98SE	W98SE	W98SE	W98SE
Part #	(99770)	(99771)	(99772)	(99773)	(99774)
GST Inc	\$Call	\$Call	\$Call	\$Call	\$Call

Powerful Aspire Desktops



Includes • microtower housing • TNT-2 16MB VGA graphics accelerator in 6400 models OR Integrated UMA 8MB graphics accelerator in 6300 models.

	Aspire 6300	Aspire 6400
CPU	Celeron 600MHz	Pentium III 733MHz
RAM	64MB	96MB
HDD	10GB	15GB
CD/DVD	50x CD-ROM	50x CD-ROM
V.90 Modem	Yes	Yes
Monitor	Aspire 17"	Aspire 17"
OS	Win98 2nd Edition	Win98 2nd Edition
Part number	(99775)	(xxxxx)
RentSmart*	\$Call/ Week	\$Call/ Week
GST Inc	\$Call	\$Call

* Not included with Aspire 6400

** Included only with Aspire 6400

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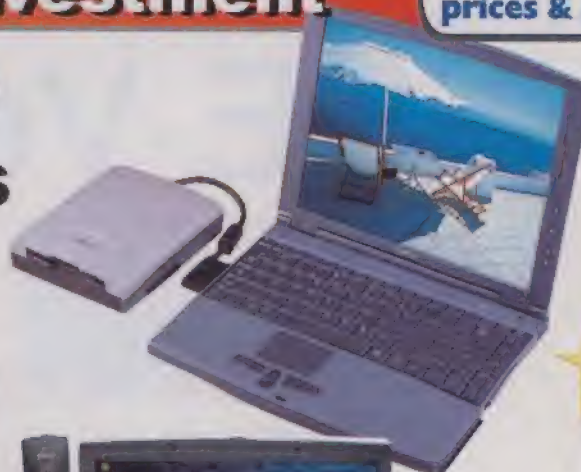
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The figures
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over
3 years.
To approved
persons, Terms
and Conditions
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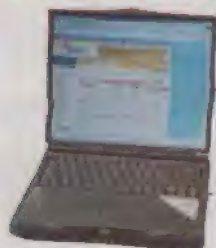
Model	341T CD	341T DVD
Screen	12.1" TFT	12.1" TFT
CPU	PIII 500MHz	PIII 500MHz
Memory	64MB	64MB
HDD	6GB	6GB
CD-ROM	24xCD	NO
DVD	NO	2xDVD
Fax/Modem	56Kbps	56Kbps
LAN Card	10/100 LAN	10/100 LAN
Op. system	Windows® 98	Windows® 98
Part number	(94817)	(94818)
GST Ex	\$4,215	\$4,654
GST	+ \$421.50	+ \$465.40
GST INC	\$4,636.⁰⁰	\$5,119.⁴⁰

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Everyone at Acer is committed to being there for you like no one else will. That's why six out of ten of Australia's biggest IT users, use Acer PCs. And why Acer was rated No.1 in customer service and support by the Australian Personal Computer magazine survey. Our quality **TravelMate notebooks** now carry our guarantee of a 2-hour warranty service in Sydney, Melbourne, Brisbane, Canberra, Perth and Adelaide*. This means we'll fix your TravelMate notebook within two hours of you dropping it off at one of our service centres. Acer is the only computer company that can make that assurance to all its customers. Call 1300 366 567 or visit www.acer.com.au.

*Metropolitan areas only.

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more
information on
BizSmart.
(BizSmart only
available with
TM514T &
TM514TXV)

Model	507DX	514T	514TXV	602TER
Screen	12.1" DSTN	12.1" TFT	14.1" TFT	13.1" TFT
CPU	Celeron® 466MHz	Celeron® 466MHz	Celeron® 466MHz	PentiumIII 650
Memory	64MB	64MB	64MB	65MB
HDD	4.8GB	4.8GB	6.0GB	12GB
CD-ROM	24xCD	24xCD	NO	20X CD-R/RW
DVD	NO	NO	2xDVD	NO
Fax/Modem	56Kbps	56Kbps	56Kbps	56Kps
LAN Card	NO	NO	NO	10/100Lan
Op. system	Windows® 98	Windows® 98	Windows® 98	Windows® 98
Part number	(94819)	(89638)	(94821)	(xxxxx)
GST Ex	\$2,075	\$2,568	\$3,759	\$5765
+ GST	+ \$207.50	+ \$256.80	+ \$375.90	+ \$576.50
GST INC	\$2,282.⁵⁰	\$2,824.⁸⁰	\$4,134.⁹⁰	\$6,341.⁵⁰



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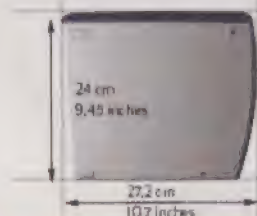
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Powerful Intel Pentium III and
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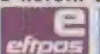
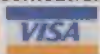


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allows instant problem
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Processor:	Celeron 500	Celeron 533	PentiumIII 600	PentiumIII 667
SDRAM	64MB	128MB	128MB	256MB
Hard Disk	8.4G	8.4G	8.4G	8.4G
FDD	optional	no floppy	optional	optional
Monitor	no	no	no	no
CD - ROM	24x	24x	24x	24x
OS	Win 98	Win 98	Win 2000	Win 2000
GST Ex	\$1,016	\$1,162	\$1,798	\$2,372
+ GST	+\$101.60	+\$116.20	+\$179.80	+\$237.20
Part No.:	(98419)	(98420)	(98421)	(98422)
GST INC:	\$1,117.⁶⁰	\$1,278.²⁰	\$1,977.⁸⁰	\$2,690.²⁰

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HP ProCurve 2224 Switch



Low-cost desktop switch ideal for delivering performance to workgroups with a mix of 10Mbps and 100Mbps devices and for migrating from 10Base-T to 100Base-TX:

- 24 10/100Base-TX autosensing ports
- One open transceiver slot
- Unmanaged
- Low, industry-leading price

GST Ex: \$1,025 + GST: \$102.50
(75515) GST INC:

\$1,127.⁵⁰

HP ProCurve Switch 2424M



Desktop switch ideal for low-cost migration to 10/100 stackable switching:

- 24 10/100Base-TX autosensing ports
- Open module slot for Gigabit stacking and uplinks
- Managed
- Low industry-leading price

GST Ex: \$2,134 + GST: \$213.40
(75513) GST INC:

\$2,347.⁴⁰

HP ProCurve 4000M Switch



A feature-rich, modular 10/100/Gigabit desktop switch that provides scalable, low-cost switching and all the benefits of HP Proactive Networking. Ideal for medium-to-large businesses looking for scalable, expandable, low-cost migration to 10/100/Gigabit switching to the desktop.

GST Ex: \$3,799 + GST: \$379.90
(66063) GST INC: **\$4,178.⁹⁰**

Optional Gigabit Module for
GST Ex: \$1,706 + GST: \$170.60
(76563) GST INC: **\$1,876.⁶⁰**

HP ProCurve Switch 408

Unmanaged 8 port 10/100 switch in a compact sized package. This switch offers half/full duplex, 10/100 autosensing on every port.

Warranty:
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GST Ex: \$444
+ GST: \$44.40
(79125) GST INC:
\$488.⁴⁰

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The Server with the best price/performance value for small businesses.

Starts your small business off on the right Track. The HP NetServer E200 offers the best value-to-performance ratio of any major server supplier.

A desktop PC may do the job when you are starting out, but as your small business expands, it quickly out grows the ability to cut corners on something as fundamental as a server. And with the HP NetServer E200 HP leads the top tier server suppliers offering full server grade technology, functionality and performance for the price of a PC.

- Intel PIII600 MHz processor with 133MHz front size bus
- 64MB registered ECC RAM standard (expandable to 768)
- 9.1GB, 7200rpm, 68-pin Ultra Wide SCSI HDD
- Four PCI, one ISA
- Integrated HP NetServer 10/100TX LAN adapter

GST Ex: \$2,711 + GST: \$271.10

(A1489) GST INC: **\$2,982.¹⁰**

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All systems include: 7 mass storage shelves (4 available after floppy, CD-ROM & 9GB disc), 6 expansion slots (5PCI, 1PCI/ISA combination), integrated 10/100 network interface, and HP TopTools for Servers Management Platform.

*Rental available To Approved Purchases. - Based on 3 year term for business use. Rental prices quoted include GST.

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*Free GST updates (including these features) will continue to be made available to registered QuickBooks V7 customers up until 1st July, 2000 to ensure that all the GST ready functionality outlined is provided. Subject to ATO requirements and changes in government legislation.

AMAZE N533

- Intel Celeron 533 CPU
- 64MB SDRAM PC133 Memory
- 10.2GB Ultra ATA 66 hard drive
- On-board CODEC Sound & Video
- 1.44MB floppy drive
- 50 x CD-ROM drive
- Mini Tower Case
- 15" Multimedia monitor

GST Ex \$1,468 + GST \$146.80 FROM (A1288)

GST INC **\$1,614.⁸⁰**

GST Ex \$1,229 + GST \$122.90 (A1290)

Without Monitor, GST INC **\$1,351.⁹⁰**

- Keyboard
- 4-Button Scroll Mouse
- Microsoft Windows 98
- Quicken QuickBooks V.7
- 3 Years On-site Warranty



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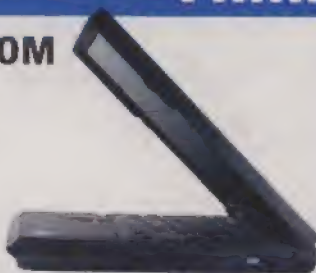
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ThinkPads

ThinkPad A20M

- Pentium III 500MHz
- 64MB RAM standard
- HDD 6GB
- 24 x CD-ROM
- 12.1" TFT screen
- Windows 2000



GST Ex \$3,452 + GST \$345.20 (A0698) GST INC

\$3,797.²⁰

Call for long term rental pricing

ThinkPad T20

- Pentium III 650SSMHz
- 128MB RAM standard
- HDD 6GB
- 6 x DVD
- 13.3" TFT screen
- Windows 2000



GST Ex \$6,032 + GST \$603.20 (A0702) GST INC

\$6,635.²⁰

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Processor	PIII667MHz	PIII733MHz
RAM	128MB	128MB
HDD	10GB	20GB
CD-ROM	40X CDROM	40X CDROM
LAN	10/100 NIC	10/100 NIC
Op System	Windows 2000	Windows 2000
**Rent TAP	\$Call	\$Call
Part No	(A1299)	(A1300)
GST Ex	\$2,015	\$2,317
+GST	\$201.50	\$231.70
=GST INC	\$2,216.50*	\$2548.70*



* Monitor not included

** Inc GST per week over 3 years

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Netfinity 3000/5000 Servers



Netfinity 5000

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- 512KB Level 2 Cache
- CD-ROM 32x max
- Dial-in for control/monitoring/remote management
- Ethernet Integrated Network Interface
- Slots and bays (total/available) PCI/ISA 5(5)x8(6)

GST Ex \$4,320 + GST \$432.00 (82774)

GST INC **\$4,752.⁰⁰**

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Netfinity 3000

- Pentium III 600MHz
- 64MB RAM standard
- HDD 9.1GB
- Maximum storage capacity 72.8
- 512KB Level 2 Cache
- CD-ROM 32x max
- 10/100BaseTX Integrated Network Interface

GST Ex \$2,798 + GST \$279.80 (94909)

GST INC **\$3,077.⁸⁰**

Call for long term rental pricing

\$\$\$

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Pricing
valid
from
1st July
2000

JUL
15

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sales@ht.com.au

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RentSmart and Harris Technology are proud to introduce Australia's first online computer finance facility, available to your business at the Harris website today!

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You can afford more with RentSmart through cashflow friendly monthly payment that are fully tax deductible for business purposes.*

What's more, renting means you can upgrade to new technology when you need.

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- 1 Simply shop for the equipment you need on the Harris site now.
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- 3 Complete the quick, secure online application form.
- 4 If you are approved with RentSmart, your RentSmart account will be automatically set up in just minutes.

RentSmart will then send you your application to sign, and your equipment will be ordered.

Remember, renting is the cost-effective solution for businesses to get the technology they need to succeed.



**Facilities mentioned on this page
available after the 4th July 2000.**



Check out how little RentSmart costs:

Purchase Price (GST Inclusive)	36 Months (per week)	24 Months (per week)
\$1000	\$11.08	\$13.87
\$2000	\$22.15	\$27.75
\$3000	\$29.73	\$39.52
\$5000	\$46.05	\$62.72

For more information, phone now on Freecall:

Harris Technology RentSmart
1300 13 99 99 1800 688 777

Prices intended as a guide only. RentSmart is available to qualifying customers on selected products with a total retail value above \$500

*Consult your accountant for further advice

**HARRIS
TECHNOLOGY™**

Pricing and specifications herein are subject to change without notice.**



**Finance methods
subject to approval**

**JUL
16**



**GST Pricing valid
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Connected Organisers

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latest prices
& products**

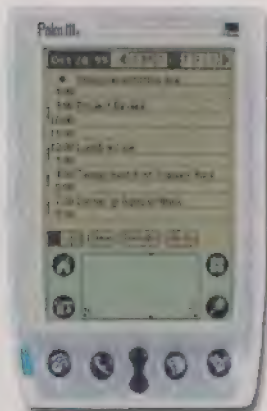


Excellent Palm™ Computing from Harris Technology

Palm™ connected organisers manage life's little details. It will help you stay on top of things everywhere you go. You can store thousands - literally thousands - of names, addresses, phone numbers, to-do's, and expenses, plus hundreds of e-mail messages. You can synchronise all your information with your computer at the touch of a button. More features: Infrared communication. Access your e-mail with the Palm Modem® accessory. Applications: Date Book, Address Book, Mail, To-do List, Memo Pad, Expense, Calculator, Security, Games, HotSync®.



Palm IIIe™ Connected Organiser One Touch Organisation



Imagine having your daily schedule, important phone numbers, lists, meeting times and more in one organised place. It's easy and affordable with a new Palm IIIe™ connected organiser. And, at just 12cm tall and a mere 170g., it can go wherever you go - be it work, home, school or on vacation. Say goodbye to your bulky paper planner. The Palm IIIe™ connected organiser is an easy-to-use, pocket-sized way to keep track of your busy life. Choose from thousands of add-on applications. Internet ready. HotSync® cradle included. Stores approximately:

- 6,000 addresses
- 5 years of appointments
- 1,500 to-do items
- 1,500 memos
- 200 e-mail messages
- and lots of third-party applications.

GST Ex \$254 + GST \$25.40
(81158) GST INC
\$279.40

Palm IIIc™ Connected Organiser Colorful



The Palm IIIc™ combines functionality and speed with advanced screen technology that renders a vivid, clear colour display. A rechargeable lithium ion battery lasts more than two weeks with normal use, and recharges in your HotSync® cradle in just minutes a day. An optional recharger kit is great when you're away from your PC. Stores approximately: • 10,000 addresses • 5 years of appointments • 3,000 to-do items • 3,000 memos • 400 e-mail messages • and lots of third-party applications.

GST Ex \$688 + GST \$68.80
(95059) GST INC
\$756.80

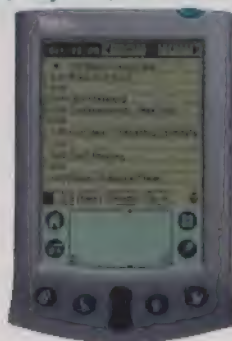
Palm™

Portable Keyboard

**Tri-fold Keyboard Goes
Anywhere!**



Palm Vx™ Connected Organiser Slim, stylish, more storage



If you're looking for the sleekest device on the market, look no further than the Palm Vx™ organiser. Weighing in at just 114 grams., it has the same anodised aluminum exterior and LCD screen as the Palm V™ organiser. Yet it has four times the memory of its predecessor, giving you more speed and more storage.

Stores approximately: • 10,000 addresses • 5 years of appointments • 3,000 to-do items • 3,000 memos • 400 e-mail messages • and lots of third-party applications.

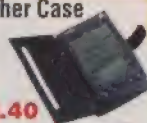
GST Ex \$628 + GST \$62.80
(95061) GST INC
\$690.80

Leave your laptop in the office. Carry this pocket-sized keyboard to take notes at your next meeting or write reports on an airplane. Folds down small. Weighing in at less than 250 grams, this full-size keyboard tri-folds into a size just slightly bigger than a Palm™ organiser itself. Unfolded, it's the same size as your desktop keyboard. No batteries required.

GST Ex \$197
+ GST \$19.70
(87210) GST INC **\$216.70**

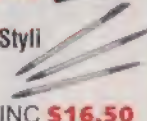
Palm Slim Leather Case

GST Ex \$44
+ GST \$4.40
(63801)
GST INC **\$48.40**



Palm III 3-pack Styli

GST Ex \$15
+ GST \$1.50
(60675) GST INC **\$16.50**



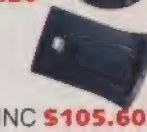
Palm III Cradle

GST Ex \$52
+ GST \$5.20
(60673)
GST INC **\$57.20**



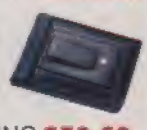
Palm V Cradle

GST Ex \$96
+ GST \$9.60
(74669) GST INC **\$105.60**



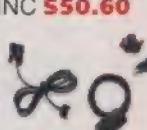
Palm V Leather Belt Clip Case

GST Ex \$46
+ GST \$4.60
(74673) GST INC **\$50.60**



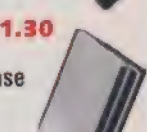
Palm V Modem

GST Ex \$283
+ GST \$28.30
(74668)
GST INC **\$311.30**



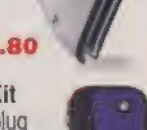
Palm V Hard Case

GST Ex \$68
+ GST \$6.80
(74676)
GST INC **\$74.80**



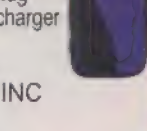
Palm V Travel Kit

HotSync cradle, plug adapters and AC charger
GST Ex \$94
+ GST \$9.40
(74677) GST INC
\$103.40



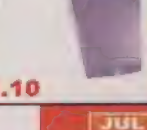
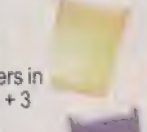
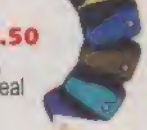
Palm III series PalmGlove Black:

GST Ex \$45
+ GST \$4.50
(82231)
GST INC **\$49.50**
Also avail: purple, olive, royal blue, teal and yellow



Palm III series Colour Shades

Pack of 3 flip covers in blue, lime & aqua + 3 black plastic styli.
GST Ex \$21
+ GST \$2.10
(82253)
GST INC **\$23.10**



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(56229)
GST INC
\$192.50

500va
GST Ex \$207
+ GST \$20.70
(56230)
GST INC
\$227.70

650va
GST Ex \$258
+ GST \$25.80
(56231)
GST INC
\$283.80



APC

Symmetra
Power Array
8kVA, exp. to
16kVA

GST Ex \$12,492+
GST \$1,249.20

(71087)
GST INC
\$13,741.20

So good we use
it ourselves!

JUL
18

APC BACK UPS PRO

FOR HUBS, SWITCHES,
ROUTERS

Smart battery backup and high performance surge suppression for Windows 95 & NT PCs

- PowerChute® Plus software lets your UPS shut down your applications gracefully in the event of an extended power failure
- Audible alarms
- Additional outlet for protection of printers
- Phone/modem protection
- User replaceable, hot swappable batteries



APC Back-UPS Pro 280si

GST Ex \$243 + GST \$24.30
(76636) GST INC **\$267.30**

APC Back-UPS Pro 420si

GST Ex \$333 + GST \$33.30
(76637) GST INC **\$366.30**

APC Back-UPS Pro 650si

GST Ex \$436 + GST \$43.60
(76638) GST INC **\$479.60**

APC Surge Arrest

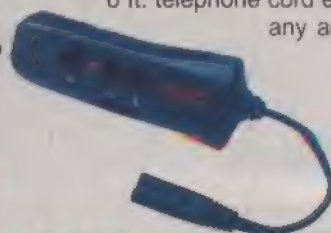
PNote Pro

SurgeArrest is equipped with a fast acting fuse that reacts quickly to lightning strikes and other catastrophic surge events. In addition, a thermal fuse shuts your system down in the event of a dangerous wiring fault. In both cases, SurgeArrest actually blocks errant power from reaching your equipment if the surge components are damaged

The SurgeArrest Notebook Pro Surge Protector provides the mobile notebook professional with advanced AC and telephone line protection. The unique, in-line design creates a compact, lightweight surge protector that is truly portable and appropriate for use in any country throughout the world. With built-in Excess Current Detection, the Notebook Pro warns you against potential modem damage. A Velcro mounting strap and 6 ft. telephone cord eliminate the need to carry any additional accessories.



SurgeArrest 5 Strip
GST Ex \$52
+ GST \$5.20
(99591) GST INC
\$57.20



PNote Pro
GST Ex \$58
+ GST \$5.80
(99592) GST INC
\$63.80

APC Smart-UPS 2U Rack Mounts

FOR SMALL
OFFICE SERVERS

New! Smart-UPS 700, 1000, and 1400 2U Rack Mounts

Utilizing Surface Mount Technology, more Application-Specific Integrated Circuits, and fewer components, we have created a more reliable UPS. New 2U(3.5in/8.89cm) design saves valuable rack U space. These models require 30% less rack height and will still fit into a 600mm four-post rack!



APC Smart-UPS 2u700

GST Ex \$809 + GST \$80.90
(99595) GST INC **\$889.90**

APC Smart-UPS 2u1000

GST Ex \$1,101 + GST \$110.10
(99596) GST INC **\$1,211.10**

APC Smart-UPS 2u1400

GST Ex \$1,613 + GST \$161.30
(99597) GST INC **\$1,774.30**

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**NEW
PRODUCT**

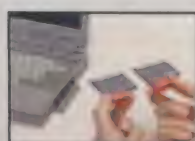
Xircom RealPort 2

**NEW
PRODUCT**

The only access cards with integrated connectors!
No more hassles with fragile cables and pop-out jacks.

The Only Personalized Notebook Communications Solutions: The RealPort2 Integrated PC Card with Built-in Connectors and Mix and Match Flexibility. RealPort2 Integrated PC Cards with built-in connectors add flexibility by enabling users to choose from a wide variety of access cards that can be used alone or mixed and matched to meet communications requirements now and in the future. Combine a 56K modem, 10/100 Ethernet LAN, wireless data access via your mobile phone, ISDN and more! And add future technologies like broadband and

5 Easy steps as follows



1

Choose Desired
Realport2 Cards



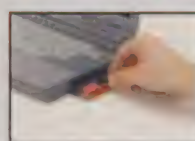
2

Flip one RealPort2
card over and place
on top of the other



3

Align tabs and join
cards



4

Insert joined cards
into PC Card slot of
Notebook



5

Plug in cables

Realport2 Global Access Modem

GST Ex: \$325 + GST: \$32.50
(92739) GST Inc: **\$357.50**

Realport2 10/100 Ethernet Card 16 bit

GST Ex: \$264 + GST: \$26.40
(92746) GST Inc: **\$290.40**

Realport2 CardBus 10/ 100 Ethernet 32 bit

GST Ex: \$264 + GST: \$26.40
(92756) GST Inc: **\$290.40**

Xircom Realport Value 56K Modem



- Speeds up to 56Kbps
- RJ 11 Connector
- LED status
- Win 95/98/NT/2000

GST Ex: \$241 + GST: \$24.10
(72923) GST Inc: **\$265.10**

Xircom Realport Ethernet 10/100 + Modem 56K



- Modem Speeds up to 56Kbps
- 10 Base T / 100 Base TX
- GSM Upgradable
- WWin 95/98/NT

GST Ex: \$608 + GST: \$60.80
(61795) GST Inc: **\$668.80**

Xircom Realport Ethernet 10/100



- 10/100 Auto negotiation
- Full duplex support
- Advanced Look-Ahead
- LAN LED's

GST Ex: \$269 + GST: \$26.90
(67216) GST Inc: **\$295.90**

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Xircom NetStation

The All in One Conference
Room Networking Solution

NetStation set up is a SNAP!



1

Plug combined power/
Ethernet cable into unit



2

Place NetStation on



3

Pull retractable
Ethernet cable and
plug into network jack

- Mounting holes and lock compatibility provide security options
- Auto negotiation of 10 or 100 Mbps (NWay) network speeds
- Half or full duplex at both speeds for increased network performance
- Two Diagnostic LED's per port provide connection status at a glance
- Dedicated bandwidth to each user



**NetStation
8 Port**



**NetStation
4 Port**

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Fax: 1300 13 6666

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E-mail: sales@ht.com.au

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JUL
19

Cost-effective Connectivity Solutions

GIGABIT SWITCHES

These 3 new gigabit switches from Netgear make it possible for small businesses and branch offices to fulfill requirements for higher bandwidth as their networks become increasingly congested. The switches provide customers a faster server connection and allow multiple Fast Ethernet users to access the server at 100 Mbps at the same time.

FS 510T GST Ex: \$16350 + GST: \$163.50
(A1209) GST Inc: **\$1,798.⁵⁰**

Eight switched 10/100Mbps ports + two 1000Mbps port (Category 5)

FS 518T GST Ex: \$2706 + GST: \$270.60
(A1374) GST Inc: **\$2,976.⁶⁰**

Sixteen switched 10/100Mbps ports + two 1000Mbps ports (Category 5)

GS 504T GST Ex: \$2,978 + GST: \$297.80
(A1375) GST Inc: **\$3,275.⁸⁰**

Four full-duplex Gigabit Category 5 ports

Please Note that Fibre Gigabit Switches are also available

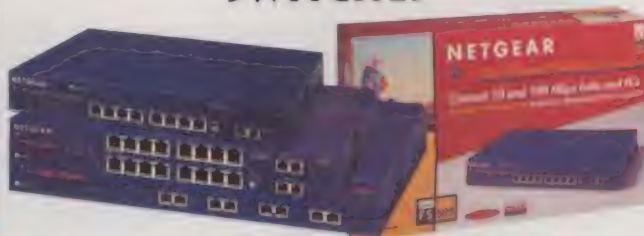
GIGABIT NETWORK CARD

GA 620T GST Ex: \$644 + GST: \$64.40
(A1382) GST Inc: **\$708.⁴⁰**

Gigabit Network Interface Card



10/100MBPS FAST ETHERNET SWITCHES



The NETGEAR FS105 and FS108 feature 5 or 8 switched 10/100 Mbps ports, auto-speed and duplex mode sensing. Versatile and compatible, Compact and easy to install. Vista jacks with built-in LEDs.

FS 105 GST Ex: \$191 + GST: \$19.10
(84722) GST Inc: **\$220.¹⁰**

5 Port Autosensing

FS 108 GST Ex: \$369 + GST: \$36.90
(70905) GST Inc: **\$405.⁹⁰**

8 Port Autosensing

FS 116 GST Ex: \$X.xx + GST: \$X.xx
(xxxxx) GST Inc: **\$Call**

16 Port Autosensing



The NETGEAR FS516 & FS524 switches provide powerful, network center performance with all 16 or 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS 516 GST Ex: \$9630 + GST: \$96.30
(60522) GST Inc: **\$1,059.³⁰**

16 Port Autosensing

FS 524 GST Ex: \$1171 + GST: \$117.10
(77549) GST Inc: **\$1,288.¹⁰**

24 Port Autosensing

RT 338 ISDN ROUTER

Latest technology with ease-of-use designs

Compatible with all major Internet ISDN equipment, this is the ideal router for Internet access, LAN-to-LAN connection, and remote access for a single user, small business or branch office over ISDN. Includes auto sensing input 10/100 network port & caller ID on phone ports.

GST Ex: \$554 + GST: \$55.40
GST Inc: **\$599.⁴⁰**

(97719)

RT 311 CABLE/DSL INTERNET GATEWAY

Connect multiple PCs to share single IP address

The NETGEAR RT311 provides NAT service that allows up to 32 users on your 10/100 network to share the high-speed Internet connection. At the same time it also provides firewall protection to guard your network against hackers and unauthorised access from the Internet.

GST Ex: \$512 + GST: \$51.20
GST Inc: **\$563.²⁰**

(97719)

RM 356 ANALOG MODEM ROUTER

Connect multiple PCs to the Internet easily

Router + integrated 56K modem + integrated 4-port 10BaseT hub • DHCP server • Dynamic NAT+ • Dial-on-Demand-routing • Hl/fn (STAC LZS) compression • 5 year warranty

GST Ex: \$512 + GST: \$51.20
(70197) GST Inc: **\$563.²⁰**

RT 328 ISDN ROUTER

Home office Internet access in a box

Includes built-in ISDN TA, 128 MultiLink PPP, DHCP Server, Dynamic NAT+, Dial-on-Demand Routing. Provides Internet access, LAN-to-LAN intranet connection, and remote access for a single user, a small business, or a branch office over ISDN.

GST Ex: \$554 + GST: \$55.40
(68900) GST Inc: **\$599.⁴⁰**



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JUL 20

Take the Work out of Networking

NETWORK STARTER KITS

The NETGEAR Network Starter kits give Windows users everything they need to start networking right away at either 10 Mbps or 100 Mbps. The kits containing 10/100 PCI cards, a hub or switch, network cables, modem sharing software and an easy to read how to guide. Within a few minutes, you will be able to share files and printers, exchange emails, play interactive games and share access to the Internet.

DB 104 GST Ex: \$236 + GST: \$23.60
4 Port Dual speed starter kit (77292) **GST Inc: \$259.⁶⁰**

SB 105 GST Ex: \$126 + GST: \$12.60
4 Port 10 Mbs starter kit (13277) **GST Inc: \$138.⁶⁰**

FB 108 GST Ex: \$327 + GST: \$32.70
8 Port switch starter kit (73997) **GST Inc: \$359.⁷⁰**

Free
modem sharing
software

Netgear offers
free, 24-hour
phone support

10MBPS ETHERNET HUBS

Vista jacks with built-in LED indicators • Uplink port for network expansion • Slim, sturdy metal case design • BNC/AUI backbone support option • Limited lifetime warranty • Easy plug and play installation

EN 104TP GST Ex: \$62 + GST: \$6.20
4 Port Slim Line (53456) **GST Inc: \$68.²⁰**

EN 108TP GST Ex: \$90 + GST: \$9.00
8 Port Slim Line (53458) **GST Inc: \$99.⁰⁰**

EN 116 GST Ex: \$203 + GST: \$20.30
16 Port Slim Line (53459) **GST Inc: \$223.³⁰**

EN 516 GST Ex: \$215 + GST: \$21.50
16 Port Rackmount (17425) **GST Inc: \$236.⁵⁰**

EN 524 GST Ex: \$281 + GST: \$28.10
24 Port Rackmount (17435) **GST Inc: \$309.¹⁰**



- 16 or 24 10BASE-T ports
- Easy plug and play installation
- Vista network port with built-in LEDs
- BNC/AUI backbone support
- Internal power supply

PRINTER SERVERS

The NETGEAR print servers let you share any parallel printer among all users on the network without having to dedicate a PC for print serving and without complex setup and configuration. These print servers connect directly to the network and can be placed anywhere convenient to the users.

With a built-in network 4 port hub, the PS105 is an all-in-one connectivity solution for the SOHO users-providing file, print and resource sharing as well as network gaming.



PS 105 10Mbps Print Server

GST Ex: \$195 + GST: \$19.50
(67225) **GST Inc: \$114.⁵⁰**



The PS110 attaches to a 10 or 100Mbps hub or switch, providing effortless transition from Ethernet to Fast Ethernet. It also supports 2 parallel printers.

PS 110 10/100Mbps Print Server

GST Ex: \$242 + GST: \$24.20
(67226) **GST Inc: \$246.²⁰**

PS 113 10/100Mbps print server supports up to 3 parallel printers

GST Ex: \$X.xx + GST: \$X.xx
(xxxxx) **GST Inc: \$Call**

10/100 DUAL SPEED HUBS

These Netgear hubs connect multiple PCs to share printers, files, Internet access and e-mail communications. Mix & match 10 and 100Mbps PCs, servers and peripherals on the same network with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug and play installation, auto-sensing dual speed ports and vista network ports with built-in LEDs.

complexity of multiple hubs and bridges. All feature easy, plug and play installation, auto-sensing dual speed ports and vista network ports with built-in LEDs.

DS 104 GST Ex: \$150 + GST: \$15.00
4 Port Slim Line (70795) **GST Inc: \$165.⁰⁰**

DS 108 GST Ex: \$236 + GST: \$23.60
8 Port Slim Line (18755) **GST Inc: \$259.⁶⁰**

DS 116 GST Ex: \$416 + GST: \$41.60
16 Port Slim Line (81519) **GST Inc: \$457.⁶⁰**

DS 524 GST Ex: \$831 + GST: \$81.30
24 Port Stackable (69474) **GST Inc: \$914.¹⁰**



\$\$\$

GST Pricing valid from 1st July 2000

NETGEAR
Ethernet
Adapter 10/
100 PCI



(53460)
GST Ex: \$51
GST: \$5.10
GST Inc: \$56.10

PCMCIA
10/100 Mbps
Network Card



(60071)
GST Ex: \$143
GST: \$14.30
GST Inc: \$157.30

USB
10 Mbps NIC



(81289)
GST Ex: \$93
GST: \$9.30
GST Inc: \$102.30

Sales: 1300 13 9999
Fax: 1300 13 6666

Website: www.ht.com.au
E-mail: sales@ht.com.au

GST Pricing valid from 1st July 2000.

Worldwide Leader in Networking for the Internet

Cisco 800 Series

The Cisco 800 series router provides enhanced network security and reliability through the power of Cisco IOS software tailored for small offices and telecommuters. It is recommended for small offices of up to 20 users, connecting every user to the Internet or to the corporate LAN with one ISDN line.

NB- all software sold separately.



Cisco 801

1 Ethernet and 1 ISDN Basic Rate Interface (BRI)

GST Ex \$999 + GST \$99.90 (78662)
 GST INC **\$1,098.⁹⁰**



Cisco 803

4 - port shared Ethernet hub, 2 analog POTS, & 1 ISDN BRI

GST Ex \$1,123 + GST \$112.30 (72566)
 GST INC **\$1,235.⁹⁰**

Cisco 805

Frame Relay, leased line, or async dial-up access to the Internet

GST Ex \$1,246 + GST \$124.60 (80398)
 GST INC **\$1,370.⁶⁰**

Cisco 1600 Series

The Cisco 1600 is the proven choice for the flexible Internet / Intranet access for small branch offices and small businesses. In addition to one fixed WAN port and one Ethernet port, the Cisco 1600 models support one WAN interface card, which allows customers to add or change WAN ports as needed. WAN options include ISDN, Frame Relay and X.25.

NB- all software sold separately.



Cisco 1601 - R

One serial port with synchronous performance up to E1 speeds for Frame Relay and X.25 WAN services, or async performance up to 115.2 kbps. Higher speed than ISDN.

GST Ex \$2,440 + GST \$244.00 (79373) GST INC **\$2,684.⁰⁰**

Cisco 1603 - R

ISDN (BRI) and ISDN leased line connectivity

GST Ex \$2,440 + GST \$244.00 (A0132) GST INC **\$2,684.⁰⁰**

Cisco 1720 Series

The Cisco 1720 access router delivers a flexible, integrated solution for small / medium businesses and small branch offices that want to deploy secure Internet, Intranet, and Extranet access. The Cisco 1720 is a fully modular solution that provides the access router, optional high-speed encryption, a VPN tunnel server, IPSec, and a dynamic firewall. This "all-in-one" solution enables you to minimize your setup costs and reduce the ongoing time and expense required to manage the network. NB- all software sold separately.



Cisco 1720- An integrated routing solution that delivers optimised security and flexibility in a desktop form factor for small / medium businesses or small branch offices interested in deploying Internet, Intranet and Extranet access. Modular WAN slots to support future growth by providing upgradeable WAN services and higher densities of WAN connections. Features and performances to support new world services including VPN's and broadband technologies. Support for encrypted WAN performances greater than 128kbps. Router configurations that require two ISDN BRI interfaces. An autosensing 10/100 Mbps Fast Ethernet LAN connection to provide easy upgrade to Fast Ethernet.

GST Ex \$1,961 + GST \$196.10 (71554) GST INC **\$2,157.¹⁰**

Cisco Catalyst 2900 Series XL

Cisco's Catalyst 2900 Series XL is a full line of stand alone, 10 / 100 autosensing Fast Ethernet switches that combine outstanding performance, ease of use, and integrated Cisco IOS software.



Catalyst 2912XL

Switch for connecting smaller Ethernet Fast Ethernet workgroups or servers
 Low entry price

GST Ex \$1,560 + GST \$156.00 (74277) GST INC **\$1,716.⁰⁰**

Catalyst 2924C XL

Dedicated 10 - Mbps or 100 - Mbps connections to individual PC's, servers, and other systems. High-speed uplink flexibility over extended distances with 100BaseFX connections (Catalyst 2924C XL only)

GST Ex \$3,669 + GST \$366.90 (78298) GST INC **\$4,035.⁹⁰**

- Prices exclude tax - Software needs to be purchased separately - Prices for 800 series routers and Catalyst switches expire 31st July as they are currently on promotion - Prices are subject to change without notification

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 TECHNOLOGY™**

Pricing** and specifications herein are subject to change without notice.



Finance methods
 subject to approval

Small-Medium Business Networks

D-Link DI-701 RESIDENTIAL GATEWAY

DIAL-UP ROUTER, INTERNET SERVER PLUS REMOTE ACCESS SERVER. PRINT SERVERS, MODEMS & ROUTERS ALSO AVAILABLE!



The D-Link DI-701 residential gateway protects your computers from hackers or unwanted users. It is the easiest and safest way to share your high speed computer internet connection with a DSL Modem or Cable Modem.

GST Ex: \$430 + GST: \$43.00
(98249) GST INC: **\$473.00**

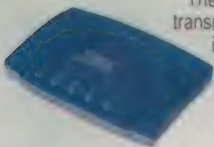
* Internet Server IP

DI - 206	1 ISDN Port, 6 Ethernet Lan Port, 2 Analog Ports, IP Routing	GST Ex: \$572 + GST: \$57.20 (99475) GST INC: \$629.20
DI - 510	1 x Wan, 1 Lan Port ISIP* Router	GST Ex: \$322 + GST: \$32.20 (79398) GST INC: \$354.20
DI - 540	4 x Wan, 1 Lan Port ISIP* router	GST Ex: \$821 + GST: \$82.10 (79400) GST INC: \$903.10

DI - 524	2 x Wan, 5 Port Hub	GST Ex: \$602 + GST: \$60.20 (79399) GST INC: \$662.20
DP - 300	Dual Speed 10/100 Mbs Multiprot Print Server 2 Parallel, 1 Serial	GST Ex: \$333 + GST: \$33.30 (53598) GST INC: \$366.30
DP - 602	Internet Server	GST Ex: \$358 + GST: \$35.80 (81535) GST INC: \$393.80
DP - 692	2 Port Internet Server with built in 9 port hub & uplink	GST Ex: \$390 + GST: \$39.00 (85108) GST INC: \$429.00
DP - 601M	Internet Server for Soho Network with Built in 56K Modem	GST Ex: \$406 + GST: \$40.60 (85107) GST INC: \$446.60

D-Link DU-560M MODEM

NETWORK ADAPTERS ALSO AVAILABLE!



The D-Link DU-560M modem provides up to 56kps transmission over the phone line. Small enough to fit in a pocket this modem is the perfect solution for desktop and notebook computers. As a USB device it is also the easiest to install.

GST Ex: \$120.00 + GST: \$12.00
(98306) GST INC: **\$132.00**

DFM - 506I	Rockwell internal PCI bus WIN Data/Fax/Voice Modem	GST Ex: \$66 + GST: \$6.60 (74361) GST INC: \$72.60
DFM - 506IS	Rockwell internal PCI bus software Data/fax/Voice Modem	GST Ex: \$60 + GST: \$6.00 (85106) GST INC: \$66.00

DFM - 560E	56 K High speed Fax Modem	GST Ex: \$109 + GST: \$10.90 (76739) GST INC: \$119.90
DE - 660CT	PC Card 10Mbps with RJ-45/BNC Connectors	GST Ex: \$102 + GST: \$10.20 (35862) GST INC: \$112.20
DFE - 530TX	PCI Bus dual speed 10/100Mbps network card	GST Ex: \$41 + GST: \$4.10 (62956) GST INC: \$45.10
DGE - 500SX	PCI Bus 1000Mg Gigabit Ethernet N/W Interface card	GST Ex: \$823 + GST: \$82.30 (90752) GST INC: \$905.30
DMF - 560TXD	56K Modem/Fax 10/100 Speed N-way PCMCIA card - NO DONGLES - Direct Port	GST Ex: \$323 + GST: \$32.30 (98305) GST INC: \$355.30
DFE - 660TX	PC Card 10/100 Base-TX Dual Speed	GST Ex: \$122 + GST: \$12.20 (69449) GST INC: \$134.20

D-Link DES-1008D SWITCH

BOOST RESPONSE TIMES AND BANDWIDTH. SWITCHES ALSO AVAILABLE!



This switch is designed to enhance SOHO performance while providing 10/100 Mbps flexibility. With 8 ports, the switch can also be deployed for the entry-level workgroup. Powerful yet easy to use, it allows users to simply plug any port to either a 10Mbps or 100Mbps node to multiply bandwidths, boost response time and satisfy heavy load demands. • Layer 2 switch • 8 10/100Mbps ports • Full/Half duplex support for each port • MDI uplink port for easy expansion • Palm-sized, Lightweight

GST Ex: \$349 + GST: \$34.90
(98254) GST INC: **\$383.90**

DES - 1016	16 Port 10/100Mbps Dual Speed, Full/half duplex	GST Ex: \$999 + GST: \$99.90 (69456) GST INC: \$1,098.90
DES - 3624 Series	Up to 24 Ports, 10/100Mbps Stack up 4 Switches	GST Ex: \$2,128 + GST: \$212.80 (90759) GST INC: \$2,340.80
DES - 1024	24 port dual speed 10/100Mbps smart rack mount switch	GST Ex: \$1,356 + GST: \$135.60 (76740) GST INC: \$1,491.60
DES - 3225G	22+2 Port 10/100Mbps dual speed Gigabit	GST Ex: \$1,990 + GST: \$199.00 (90755) GST INC: \$2,189.00
DES - 1005D	Switch PC Card 10/100 Base-TX Dual Speed	GST Ex: \$144 + GST: \$14.40 (85101) GST INC: \$158.40

D-Link DFE-905DX NETWORK STARTER KIT

USB PORTS AVAILABLE!



The D-Link DFE-905 is a Dual Speed 5-port dual speed hub that can be configured to either 10Mb or 100Mb speeds. It is designed to offer connectivity in the small home, small office environment. The palm-sized device provides 5 ports to flexibility connect a small workgroup together on an Ethernet or Fast Ethernet network.

DE - 809TP	9 Port Mini- Hub 9 x UTP with Uplink Capability	GST Ex: \$125 + GST: \$12.50 (32350) GST INC: \$137.50
DE - 816TP	16 Port 10Mb Hub with 1xAU/1xBNC Ports Rackmount	GST Ex: \$222 + GST: \$22.20 (51844) GST INC: \$244.20
DFE - 905	Fast Ethernet Network Kit	GST Ex: \$244 + GST: \$24.40 (76617) GST INC: \$268.40

DFE - 908DX	10/100 Mbs 8 port Stackable dual speed hub	GST Ex: \$274 + GST: \$27.40 (60558) GST INC: \$301.40
DFE - 916DX	16 Port 10/100Mbps Desktop Hub	GST Ex: \$516 + GST: \$51.60 (87207) GST INC: \$567.60
DFE - 2624X	24 Port 10/100 Mbs Dual Speed Hub	GST Ex: \$1,064 + GST: \$106.40 (98307) GST INC: \$1,170.40
DU - A2	PCI Port USB Adapter USB to Ethernet	GST Ex: \$48 + GST: \$4.80 (78987) GST INC: \$52.80
DU - H4	4 Port USB Hub	GST Ex: \$66 + GST: \$6.60 (79131) GST INC: \$72.60
DU - H3SP	3 Port USB Hub	GST Ex: \$143 + GST: \$14.30 (78989) GST INC: \$157.30



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ServerLink to computer cable

Each end of
the cable fans
out into three
connectors.
2m cable
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and monitor
GST Ex \$26
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\$28.60

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+ GST \$5.80
(63976)

GST INC
\$63.80

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for
AT/Serial
mouse,
keyboard
and monitor
GST Ex \$26
+ GST \$2.60
(63974)

GST INC
\$28.60

5m cable
GST Ex \$58
+ GST \$5.80
(63977)

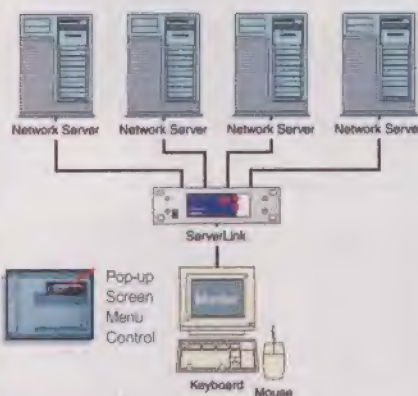
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Multi-Server Controllers

Control up to 256 network servers with a single monitor, keyboard & mouse

With a ServerLink KVM switch you can monitor and fully control up to 256 network servers with just one monitor, keyboard and mouse. Save money on expensive monitors, create more working space and cut down on your power costs.



Designed and manufactured in Australia by an award winning engineering company, ServerLink is packed with features, providing total control of your ever expanding network.

- Select servers via On-Screen-Display or Front Panel
- Name servers for simple selection
- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic server monitoring
- Standard cables used throughout
- Cascadeable to control up to 256 servers
- 8 and 16 port models 19 inch rack mounted design
- Australian designed and manufactured

FROM **\$349.⁸⁰**



ServerLink™

- EPROM upgradeable for future technology
- Supports PS/2 and Serial mouse emulation



SL-401E	4 Port ServerLink Controller for PS/2 only	GST Ex \$318 + GST \$31.80 (71652) GST INC \$349.⁸⁰
SL-401	4 Port ServerLink Controller	GST Ex \$670 + GST \$67.00 (63724) GST INC \$737.⁰⁰
SL-801	8 Port ServerLink Controller	GST Ex \$1,119 + GST \$111.90 (63777) GST INC \$1,230.⁹⁰
SL-1601	16 Port ServerLink Controller	GST Ex \$1,881 + GST \$188.10 (63778) GST INC \$2,069.¹⁰

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SERVERLINK INFINITY

**PS-2
ONLY**

- Password protection for security
- Flash ROM upgradeable for future technology



SL-821	8 Port ServerLink Infinity controller	GST Ex \$974 + GST \$97.40 (97888) GST INC \$1,071.⁴⁰
SL-821-P	8 Port ServerLink Infinity controller incl 8x2m Cables	GST Ex \$1,131 + GST \$113.10 (97889) GST INC \$1,244.¹⁰
SL-1621	16 Port ServerLink Infinity controller	GST Ex \$1,633 + GST \$163.30 (97890) GST INC \$1,796.³⁰
SL-1621-P	16 Port ServerLink Infinity controller incl 16x2m Cables	GST Ex \$1,934 + GST \$193.40 (97891) GST INC \$2,127.⁴⁰

Quantum

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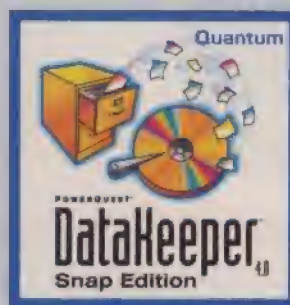
Web
Direct

www.ht.com.au/cat/quantum

Low Cost, Fast Storage

No other storage solution allows you to add so much storage so quickly and at such a low cost, and supports as many network protocols simultaneously right out of the box as the Snap Server. Normally, your choices for added network storage have been to increase space on an existing file server, or to add a new file server. Adding a disk drive to a file server is risky and labour intensive, usually taking at least

half a day, during which your server is off-line. Adding a file server is also costly, starting at around \$3,000 and costing as much as \$10,000 or more, and requires one to three days of labour. Snap Servers are different because they connect directly to the network (not to a file server), offer easy installation, simple administration, equivalent network performance, and low cost.



More Reliable - Quantum's Snap Servers are more reliable than general purpose servers because they do one thing very well - serve files, rather than simultaneously perform many diverse tasks.

Network Backup - All Snap Server models are compatible with major enterprise back up solutions from Veritas, Legato and Computer Associates.

Free Backup utility: DataKeeper Snap Edition - Snap Server DataKeeper Snap Edition is designed to work with the Snap Server to provide transparent backup of user data for all your networked and mobile PC's and workstations

Key Features

- Storage options - 10GB, 20Gb, 40GB and 120GB
- Easy installation - No technical experience is needed to install a Snap Server.
- Managed via the Web from any client on the network or from anywhere on the Internet
- Multiple Snap Servers can run on the same network for extended usability.
- Offers mixed-network support, pre-configured for integration into all major network environments including NT, NetWare, UNIX and Apple.
- Supports the protocols most commonly found in today's networks, including TCP/IP, IPX, NetBEUI and AppleTalk.
- The Snap Server is the only product in its class that can be integrated within existing Microsoft NT Domain and Novell NetWare bindery servers.
- RAID support: RAID 0,1 (Snap 2000 / 20 & 40GB), RAID 0,1,5 (Snap 2000 / 120GB)

SNAP 1000- 10GB	GST Ex \$1,082.00 + GST \$108.20 (A0046) GST INC	\$1,190.²⁰
SNAP 2000- 20GB	GST Ex \$1,733.00 + GST \$173.30 (A0047) GST INC	\$1,906.³⁰
SNAP 2000- 40GB	GST Ex \$2,856.00 + GST \$285.60 (A0048) GST INC	\$3,141.⁶⁰
SNAP 4000- 120GB	GST Ex \$5,550.00 + GST \$555.00 (A0051) GST INC	\$6,105.⁰⁰

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Camera's, CD-Rom and CD/DVD Tower

Axis Network Cameras

If a picture says a thousand words then an Axis network camera can speak volumes.



Axis 200+ Network Camera

The 200+ is a low frame rate network camera that can connect to an Ethernet LAN or dial-up modem telephone line and send a new image at specified intervals via Internet Protocols to your web site, an email box, network server or simply viewed using a web browser. Axis 200+ cameras are in use on ski fields, railway stations, beaches, city views, kindergartens, zoos and more locations than can be listed. Axis 200+ cameras make the associated web sites interesting, up to date and exciting. The 200+ supports a range of third party lenses and provides video control signals to control auto-iris lenses, which are essential on any digital camera that is used outdoors or in bright light.

GST Ex \$1,687 + GST \$168.70 (47582) GST INC

\$1,855.⁷⁰

Axis 2100

Like the 200+, the 2100 produces exciting clear images and transmits them over the network. Its state-of-the-art technology and embedded Linux operating system gives it the ability to transmit jpeg images at 10 frames per second. The 2100 is designed for indoor use and features a stylish plastic case and easy setup wizards. As an indoor camera the 2100 dispenses with unnecessary auto-iris video control signals in favour of lower price.

GST Ex \$960 + GST \$96.00 (97648) GST INC

\$1,056.⁰⁰



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PlexWriter 12/4/32

CD-Rewritable SCSI Drive

12X CD-Write, 4X CD-Rewrite, 32X max CD-Read

The PlexWriter 12/4/32 combines Plexor's proven reliability with the most exceptional record, rewrite and playback capabilities available. While achieving CD-Recording at blazing 12X speeds, the PlexWriter 12/4/32 maintains the highest quality and stability while creating a 650MB disc in just 6 minutes. Fast 160ms average random access time and burst transfer rates of 20MB/sec make this drive a top performer. With 32X max read, the PlexWriter 12/4/32 qualifies as a full-time replacement of your existing CD-ROM or CD-R Drive.

GST Ex \$790 + GST \$79.00 (99620) GST INC

\$869.⁰⁰

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Optistor CD/DVD Caching Tower

The Optistor CD/DVD caching tower features the Axis CDE100 CD-ROM Server giving support for hard disc caching for up to 100 CD's. Great news for organizations that require fast access to information stored on CDs and DVDs!

The towers are available with 1, 5 or 6 DVD ROM drives and hard drive storage capacity for 25, 50 or 100 full CD's. All towers are fully compatible with NetWare, Windows 95/98 and NT, Mac and TCP/IP, allowing users to access CDs and DVDs simultaneously over the network.

Installation is easy. The Optistor CD/DVD Caching Tower plugs directly into a LAN or WAN via Ethernet or Fast Ethernet in under 5 minutes without bringing down the server network. Add this to the ease of use, fast access to CD's and DVD's and remote administration and you have a complete solution in a box.

5 CD/DVD drive holds 100 discs

GST Ex \$7,670 + GST \$767.00 (99600) GST INC

\$8,437.⁰⁰

6 CD/DVD drive holds 27 discs

GST Ex \$4,582 + GST \$458.20 (99602) GST INC

\$5,040.²⁰

6 CD/DVD drive holds 50 discs

GST Ex \$5,748 + GST \$574.80 (99605) GST INC

\$6,322.⁸⁰



CD-R/CD-RW: Storage for life

Verbatim

CD Media

Writable:(CD-R)

74 min. 650MB Single (74740)

GST Ex: \$2 + GST: \$0.20

GST Inc: **\$2.20**

74 min. 650MB 10 Pack (76731)

GST Ex: \$16 + GST: \$1.60

GST Inc: **\$17.60**

80 min. 700MB Single (87392)

GST Ex: \$2 + GST: \$0.20

GST Inc: **\$2.20**

DataLifePlus® Envelope

74 min. 650MB 10 Pack (99682)

GST Ex: \$19 + GST: \$1.90

GST Inc: **\$20.90**

ReWritable:(CD-RW)

74min. 650MB 2x/4x Speed Single (77492)

GST Ex: \$6 + GST: \$0.60

GST Inc: **\$6.60**



Verbatim DataLifePlus® discs have an extra durable, printable surface.

Verbatim

CopySmart CD Duplicator



4x Write, 4x ReWrite,
32x Read

COPYSMART 4x4x32xCD DUPLICATOR

As easy to use as a photocopier!

Stand-alone or PC connected one-to-one duplicator able to record to both CD-R and CD-RW media. 4x CD-R, 4x CD-RW copy functions. Simple 4 button interface allowing Speed selection, Test, Copy, Compare and Quick Erase. PC based Data and Audio copying Software included.

GST Ex: \$1,543 + GST: \$154.00 (92173)

GST Inc **\$1,697.00**

Verbatim

Signature III Colour CD Printer

Personalise your CD's

The Signature III Colour CD Printer is a new, third generation ink-jet CD Colour printer from industry leader Primera Technology. It combines the fastest print speed ever offered with the highest print resolution available in the world today: 1200x1200dpi for a stunning 1.44 million pixels per square inch.



GST Ex: \$2,459 + GST: \$245.90 (89186)

GST Inc **\$2,704.90**

Verbatim

Comet Autoloader for Signature Printers

Printer
pictured
but not
included



Hands Free CD Printing!

The Champion Comet is the first economical, desktop printer loader designed for the Signature II and III printers. The loader stacks up to 50 printable discs then loads them into the printer tray. After printing, the discs are deposited into the output tray.

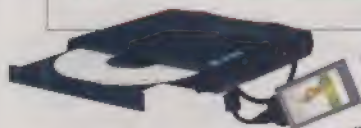
GST Ex: \$2,411 + GST: \$241.10 (97769)

GST Inc **\$2,652.10**

Verbatim

Slim-line PC Card CD-ROM Drive

Add a CD-ROM to your Laptop!



This 24xCD-ROM can connect to any PC Card enabled PC or Notebook and is ideal for mobile computing for notebook users with no CD-Rom drive built-in. The drive is plug-and-play making installation a breeze and the slim-line tray reduces the size of traditional external PCMCIA CD-ROM drives through its lightweight and low profile design. The control panel on the top of the case allows for easy playback of audio CD's

GST Ex: \$297 + GST: \$29.70 (97766)

GST Inc **\$326.70**

Verbatim

56K Compact Modem

Compatible with Windows® CE based
Palm PCs & Handheld PCs

The Pretec CompactModem from Verbatim is the world's first and smallest 56kbps Fax/Modem card for Windows CE based Palm PCs and handheld PCs. Video conferencing ready. Supports V.80 application for synchronous H.324 streaming. Supports V.90 and K56flex. Win 95/98/NT /CE compatible. By connecting the CompactFlash adapter included, this modem also becomes a fully-fledged PC card able to be used with most laptops/notebooks.



GST Ex: \$255 + GST: \$25.50 (83607)

GST Inc **\$280.50**

More From Verbatim

CD Travel Case

Lightweight. Scuff proof exterior. Fabric lined disc holders prevent scratching and sticking of CD's.



For 24 CDs:
(79583)
GST Ex: \$18
+ GST: \$1.80
GST Inc:

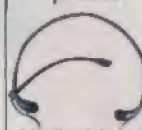
\$19.80



For 48 CDs:
(79584)
GST Ex: \$25
+ GST: \$2.50
GST Inc:

\$27.50

Headset with Microphone



Vertical in-ear stereo headphone with adjustable microphone boom. Ideal for notebook users. Designed for multimedia convenience. Lightweight and compact, adjustable headband. (Must be powered by a soundcard)

(77819)
GST Ex: \$17
+ GST: \$1.70
GST Inc:

\$18.70

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Access
with TPG**

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**one-off \$39.95 admin fee, 300MB Download limit per month. Unlimited 3 hour connections. Offer available for a limited time.

Dynalink 56K Voice/Fax/Data Speakerphone Modem

"Good value for money... ease of setup and use is excellent... consistently connects at high speeds."
PC World Nov 99



**5 Year
Warranty**

GST Ex \$118
+ GST \$11.80

(54361) GST INC **\$129.80**

- V.90 / K56flex dual-mode for high Internet compatibility
- Plug and play, plus friendly QuickGuide for easy installation
- Send and receive faxes from your PC
- Supports FaxStream DUET, Caller ID, Speakerphone Mode and VoiceMail

For more info on any of Dynalink's products, please visit www.dynalink.com.au

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Dynalink V.90/56K ISA or PCI Card Modem

**5 Year
Warranty
on ISA**



ISA: All the features of the External. Manually configurable Jumper Settings. PCI: Plug and Play Installation - V.90/K56flex dual mode for high Internet compatibility - Telephone answering machine mode - Send and receive faxes from your PC.

ISA: GST Ex \$114 + GST \$11.40
(77577) GST INC **\$125.40**

PCI: GST Ex \$67 + GST \$6.70
(72909) GST INC **\$73.70**

DYNALINK USB MODEM

- * Super-easy Installation.
- * Free up Slots and IRQs.
- * No Power Supply, No Messy Cables.
- * Dual-mode V.90, Fax Machine, Answer Machine.



**5 Year
Warranty**

GST Ex \$149
+ GST \$14.90
(90116)

GST INC **\$163.90**

MagicXpress TView Video Capture Card

"One of the two best cards in terms of picture quality" APC, July 9. Watch TV on your computer monitor and capture incoming video (e.g. from CamCorder). Fully featured, including Teletext and remote control. Resizable window, right up to full-screen (640x480).



Standard: GST Ex \$113 + GST \$11.30
(72860) GST INC **\$124.30**

With FM Tuner: GST Ex \$157 + GST \$15.70
(78482) GST INC **\$172.70**

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HP OfficeJet G Series

NEW!

HP OfficeJet T45 All Colour: Printer, Copier, Scanner & Fax

- 600x600dpi InkJet Printer with HP PhotoRET II
- Up to 9ppm print speed (black) and 6.5ppm (colour)
- 75 speed dials, 55 page fax memory
- Up to 1200dpi enhanced (300dpi optical) scanning, 24bit colour
- Up to 99 copies from original



GST Ex \$720 + GST \$72 (84356)

GST INC **\$792.00**

HP OfficeJet G85 All Colour: Printer, Copier, Scanner & Fax

The OfficeJet G85 not only provides incredible printing, scanning and copying but is also a fully featured colour standalone fax.



GST Ex \$1,361 + GST \$136.60 (A0062)

GST INC **\$1,497.10**

HP OfficeJet R65 Gives you high quality performance for professional results

- 600 x 600 dpi for black text and color printing
- up to 11 ppm for black text and 8.5 ppm per minute for color
- Prints on a wide variety of paper types and sizes: letter, legal and A4 sizes: plain, transparency, photo, envelopes, labels, cards, iron-on T-shirt transfers, & banners



GST Ex \$947 + GST \$94.70 (80322)

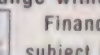
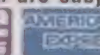
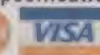
GST INC **\$1,041.70**

\$\$\$
**GST
Pricing
valid
from
1st July
2000**

28

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TECHNOLOGY.**

Pricing** and specifications herein are subject to change without notice.



Finance methods
subject to approval

Making images work for you

**NEW
PRODUCT!**

ePhoto CL18

Dual Mode: (point-and-shoot digital camera with video conferencing, video clipping and video e-mailing features), VGA (640 x 480 pixels) optical resolution with CMOS sensor, 32 images on internal 2Mb memory (non removable), Optical viewfinder, Built-in Flash, ISO 200, Includes camera cradle for video conferencing, USB interface. Excellent s/w bundle (Twain driver, Corel PrintHouse, Corel PhotoHouse, Microsoft NetMeeting, ArcSoft VideoImpression)

GST Ex: \$306 + GST: \$30.60
(99757) **GST Inc: \$336.60**

**NEW
PRODUCT!**

SnapScan e50

1200 x 2400 optical resolution (9600 maximum), 42 Bit, USB interface, Integrated TPO for transparency and negative scanning, 4 front panel buttons (programmable), 3 interchangeable coloured handles and button covers. Agfa ScanWise and comprehensive software package including Corel Print Office 200 and ReadRis

GST Ex: \$382 + GST: \$38.20
(99759) **GST Inc: \$420.20**

ePhoto CL30 Klik!

The fantastic ePhoto CL30 now available with built-in Iomega Klik! Drive. Mega-pixel digital camera with USB interface and a resolution of 1440x1080 pixels. Features an optical viewfinder and 1.8" colour LCD screen. Auto focus lens with 2x digital zoom and macro function.



GST Ex: \$1032 + GST: \$103.20
(89409) **GST Inc: \$1,135.20**



SnapScan 1212u

One pass, high quality 600x1200ppi scanner (9600ppi max.) with USB interface. Includes Caere OmniPage LE OCR, Caere PageKeeper, Corel Print-House Magic Select & Agfa's incredible ScanWise software. Mac and

White
GST Ex: \$223 + GST: \$22.30
(74496) **GST Inc: \$245.30**

Win98/Win2000 compatible
"Best Scanner 1999" -
PC World magazine

SnapScan Touch

Agfa's revolutionary SnapScan Touch USB Scanner has four programmable buttons: scan direct to file, email, fax or printer. 600x 1200 ppi, 36 bit, landscape desktop scanner. Comes with 7 translucent coloured handles! Software: Agfa ScanWise, Caere OmniPage LE, Caere PageKeeper (PC only) Micro Frontier Color IT! (Mac only) and Corel Print House

GST Ex: \$251 + GST: \$25.10
(87209) **GST Inc: \$276.10**



SnapScan 1212p

One pass, high quality 600x1200ppi scanner (9600ppi max.) with parallel interface. Includes Caere OmniPage LE OCR, Caere PageKeeper, Corel Print-House Magic Select & Agfa's incredible ScanWise software. Compatible with Win95/98/NT.

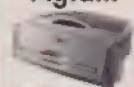
GST Ex: \$166 + GST: \$16.60
(74495) **GST Inc: \$182.60**

SnapScan 1236u

One pass, high quality 600x1200ppi scanner (9600ppi max.) with USB interface. 36 bit colour. Comes bundled with Caere OmniPage LE OCR, Caere PageKeeper, Corel Print-House Magic Select & Agfa's incredible ScanWise software. Mac and Win98/Win2000 compatible. ADF & TPO available.

GST Ex: \$323 + GST: \$32.30
(84306) **GST Inc: \$355.20**

More from Agfa...



DuoScan HiD
(92981)
GST Ex: \$3,814
+ GST: \$381.40
GST Inc: **\$4,195.40**

Transparency adapter for SnapScan 1236. Moving light source. 203x254mm. (76779)

GST Ex: \$276
+ GST: \$27.60
GST Inc: **\$303.60**

Document Feeder for DuoScan T1200. (75581)
GST Ex: \$379
+ GST: \$37.90
GST Inc: **\$416.90**

Batch Slide holder set for DuoScan

T1200. (75582)
GST Ex: \$203
+ GST: \$20.30
GST Inc: **\$223.30**



DuoScan T1200 SCSI-2. 36 bit. Transparency scanning. Opt. res. 600x1200ppi (74498)

GST Ex: \$1,325
+ GST: \$132.50
GST Inc: **\$1,457.50**



DuoScan T2500 SCSI-2. 36 bit. Transparency scanning. True opt. res. 1250ppi (74499)

GST Ex: \$6909
+ GST: \$690.90
GST Inc: **\$7,599.00**

Kodak

GST Pricing valid
from 1st July 2000

Web
Direct

www.ht.com.au/cat/kodak

Dynamic Images. Dynamic Results.

Kodak DP2000 Digital Projector

Looks Good Anywhere

The KODAK DP2000 Projector has a sleek, contemporary design that's rugged enough to hit the road in style. It's the perfect partner for today's powerful laptop and handheld computers. Finally, a projector that's all new and all yours—right in the palm of your hand.

Just Plug, Play and Present

Set up your hardware in seconds. Then, take full advantage of the DP2000's multimedia capabilities to add sound, special effects, animation, live Internet connections and full-motion video. The DP2000 gives you all the cables you need and handles all these demanding applications with ease.



GST Ex: \$9,328 + GST: \$932.80

(99615) GST Inc: **\$10,260⁻⁸⁰**

Kodak Accessories 32MB Picture Card

(62677)
GST Ex: \$156
+ GST: \$15.60
GST Inc:

\$171.60

64MB Picture Card

(82249)
GST Ex: \$241
+ GST: \$24.10
GST Inc:

\$265.10

96MB Picture Card

(88332)
GST Ex: \$369
+ GST: \$36.90
GST Inc:

\$405.90

Premium Camera Bag

(82273)
GST Ex: \$53
+ GST: \$5.30
GST Inc:

\$58.30

80 Minute Ultima

(94493)
GST Ex: \$2
+ GST: \$0.20
GST Inc:

\$2.20

Kodak Gold 10 Pack

(53993)
GST Ex: \$22
+ GST: \$2.20
GST Inc:

\$24.20

Kodak DC280

Fast, responsive and sophisticated, the KODAK DC280 means business. Its intuitive design and responsive performance mean there's little learning curve. The DC280 lets you capture business images quickly and professionally. And then put them to work immediately.

- 2 Million Pixel Resolution
- 2x Optical and 3x Digital Zoom Lens
- USB compatible
- 8MB Picture Card
- Photodeluxe Pagemill and Photoprinter Software
- Rechargeable batteries and charger included



GST Ex: \$846 + GST: \$84.60

(80361) GST Inc: **\$930⁻⁶⁰**

Kodak DC290

The model of choice for high-end business picture takers. It gives you the ultimate in digital control thanks to its ability to "learn" scripts and applications—much like you'd customize your PC with different software.

- 2.1 Million Pixel Resolution
- Up to 3.3 Million Pixel Interpolated Resolution
- 3x Optical and 2x Digital Zoom
- JPEG and Uncompressed TIFF File Format
- Audio record and playback
- Burst capture mode
- 16MB Picture Card
- Rechargeable batteries/charger included



GST Ex: \$1,228 + GST: \$122.80

(84735) GST Inc: **\$1,350⁻⁸⁰**

Kodak DC215 Zoom

It's a snap to use, thanks to the award-winning interface and controls. And we've packed all this functionality into a silver metal-skinned design, among the most compact on the market.

- 1 Million pixel resolution
- 2x wide angle (29-58mm) optical glass zoom lens
- 4MB picture card



GST Ex: \$362 + GST: \$36.20

(80360) GST Inc: **\$398⁻²⁰**

Kodak DC215 Millennium

Represents outstanding value for money with USB card reader for up to 10 downloads. Stunning Gold Metal-skinned design amongst the best on the market.

- 1 Million Pixel Resolution
- 2x wide angle (29x58mm) optical glass zoom lens
- 4MB picture card
- Photodeluxe and pagemill software
- USB card reader included



GST Ex: \$448 + GST: \$44.80

(81279) GST Inc: **\$498⁻²⁰**

Kodak DVC 325

The KODAK DVC325 Digital Video Camera is the easy, fun way to capture and share quality digital pictures and video.

- Full motion video up to 30 frames per second
- Great 640x480 Still Images
- USB Interface
- Create videos that include text, video, audio and special effects with Presto!
- Videoworks software included
- Standard Tripod Socket



GST Ex: \$149 + GST: \$14.90

(80362) GST Inc: **\$163⁻⁹⁰**

Kodak 4804IDE CD-R/RWriter

- 24x Read, 4x CDR Write, 4x CDRW Write
- Disk-at-once and Track-at-once mode recording
- ATAPI Enhanced IDE Interface
- Gazo Personal Imaging Warehouse software



GST Ex: \$385 + GST: \$38.50

(84028) GST Inc: **\$423⁻⁵⁰**

JUL
30

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Finance methods
subject to approval

Build your Desktop with Logitech

QUICKCAM™ EXPRESS

Snap stills. Shoot video. Email them anywhere in one click. Make live video calls! **QuickCam™ Express** – The simple way to get closer™.

- Capture stills and video instantly
- Email images with a single click
- Meet face-to-face online
- Over 2 million QuickCams sold
- USB connector for easy installation
- Works with Windows® 95 or 98



GST Ex: \$88 + GST: \$8.80
(80121) **GST Inc: \$96.80**

QUICKCAM PRO USB

True 640x480 resolution for stunning videos and pictures. With the QuickCam software, build fun web pages complete with streaming video or make live video calls (includes a Labtec microphone) over the Internet. Add titles, fade-in and fade-outs, audio tracks and more to your videos. Enhance your pictures with special effects such as sharpen, blur and more. And with the included digital surveillance software, easily set up a digital security camera.



GST Ex: \$240 + GST: \$24.00
(70566) **GST Inc: \$264.00**

DEXXA OPTICAL MOUSE



Silver Optical mouse with 5 buttons and a wheel for easy scrolling and zooming and precise control. Fully compatible with Windows 95/98 and Windows 2000. Solid state Optical Technology means no ball mechanism to clean.



GST Ex: \$43 + GST: \$4.30
(A1029) **GST Inc: \$47.30**

INTERNET KEYBOARD

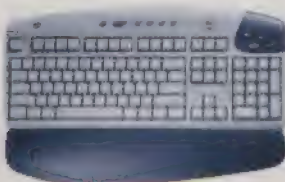
The Logitech Internet keyboard and iTouch software put one-touch Internet and multimedia control at your fingertips. Responsive keys provide an exceptional touch. Relax your hands on the attractive palm rest during breaks, and easily remove it for extra space. 3-year warranty.



GST Ex: \$52 + GST: \$5.20
(60332) **GST Inc: \$57.20**

CORDLESS DESKTOP

A cordless keyboard and cordless wheel mouse combination to free you from cords that tangle. No pointing at the computer or clear path required.



With convenient iTouch Internet and multimedia control, access the Internet, search, open e-mail, play CDs, DVDs or MP3 and more with one touch of a key. 5-year warranty.



GST Ex: \$154 + GST: \$15.40
(82772) **GST Inc: \$169.40**

CORDLESS DESKTOP PRO

Cordless keyboard designed for easier typing and contoured soft-touch cordless wheel mouse free you from tangled cords. Innovative mouse design maximises comfort and control. Features convenient iTouch Internet and multimedia controls. 5-year warranty.

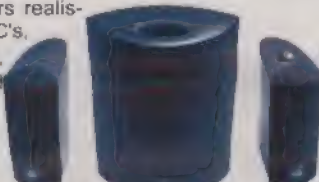


GST Ex: \$209 + GST: \$20.90
(87605) **GST Inc: \$229.90**

SOUNDMAN X1 SPEAKERS

Experience the full richness of CDs, MP3 and multimedia. Innovative compact design delivers realistic, high definition sound for PC's, portable CD players and TV. High definition sound with solid bass - 25 Watts RMS.

- Excellent for CD music, Internet and MP3 audio
- 3 year warranty



GST Ex: \$116 + GST: \$11.60
(81655) **GST Inc: \$127.60**

TRACKMAN MARBLE FX

Revolutionary, finger-operated trackball. Optical sensing technology provides unmatched reliability and precision. Personalize performance by assigning one-click commands to the buttons. Three-year warranty.



GST Ex: \$119 + GST: \$11.90
(54912) **GST Inc: \$130.90**

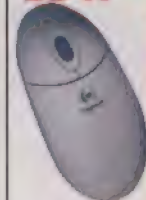
Mini Wheel Mouse
(97717)
GST Ex: \$64
+ GST: \$6.40
GST Inc:
\$70.40



Marble Mouse
(69760)
GST Ex: \$56
+ GST: \$5.60
GST Inc:
\$61.60



Cordless Wheel Mouse
(77761)
GST Ex: \$83
+ GST: \$8.30
GST Inc:
\$91.30



Cordless Mouseman Wheel
(78677)
GST Ex: \$105
+ GST: \$10.50
GST Inc:
\$115.50





YAMAHA

For the latest pricing have a look at this Web Direct link:

Web
Direct

www.ht.com.au/cat/yamaha

Specialists in Sound and Storage

YAMAHA CDR SOLUTIONS

\$\$\$

GST
Pricing
valid
from
1st July
2000



NEW

(8)(8)(24)
WRITE REWRITE READ

- 4 Mb Buffer
- New optical pickup design
- 24X audio extraction
- A full disc, on a CDR or an 8X CD-RW disc, in around 9 minutes!!

YAMAHA CRW8824 Series

Yamaha leads the way again with the new 8X re-writeable format, just established. As well as CDR writing of a full disc in around 9 minutes, you can re-write at 8X as well, when using the new 8X rewriteable discs. Other improvements include 24X Digital Audio Extraction for fast audio disc compilations, a newly designed optical pickup and support of CD-Text. Improved packet written disc reading performance makes CDR reading and writing faster and easier than ever.

- AVAILABLE IN E-IDE KIT, SCSI INTERNAL AND EXTERNAL KITS, AND THE NEW IEEE-1394 KIT!!!

Enhanced IDE Kit
(A1468)
GST Ex: \$444
+ GST: \$44.40
GST Inc:

\$488.40

CRW8424EVK- E-IDE kit, complete with Adaptec Easy CD Creator, Direct CD V3.0, Take Two backup software, power cable, screws, manual, Australian Warranty.

GST Ex: \$452 + GST: \$45.20

(90113) GST Inc: **\$497.20**

CRW8424SVK- SCSI Internal Kit, with Adaptec Easy CD Creator, Direct CD V3.0, Take Two backup software, power cable, screws, manual, Australian Warranty. No SCSI Card Incl.

GST Ex: \$481 + GST: \$48.10

(90112) GST Inc: **\$529.10**

CRW8424SXVK- SCSI External Kit, with Adaptec Easy CD Creator, Direct CD V3.0, Toast for Mac V3.5, Take Two software, power cable, manual, Australian Warranty. No SCSI Card or Cable.

GST Ex: \$614 + GST: 61.40

(90114) GST Inc: **\$675.40**

YAMAHA SPEAKERS

Wine
on-line?



vintagecellars.com.au



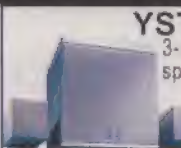
YSTM40

2x12 W speakers - a quality desktop pair. Dual analogue inputs. Advanced Servo Technology for deeper bass.

NEW

GST Ex: \$99.00 + GST: \$9.90

(99555) GST Inc: **\$108.90**

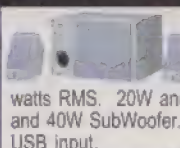


YSTMS30

3-piece Powered Multi-media speakers/sub-woofer with 30 watts of power and magnetic shielding to eliminate monitor distortion.

GST Ex: \$120.00 + GST: \$12.00

(86029) GST Inc: **\$132.00**



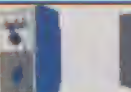
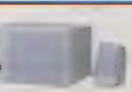
YSTMS55D

Satellite/Sub "Killer" system, with 80 watts RMS. 20W and 20W (left and right) and 40W SubWoofer. 2 Analogue and 1 USB input.

GST Ex: \$229.00 + GST: \$22.90

(91345) GST Inc: **\$251.90**

Yamaha audio quality makes such a difference to your desktop!



Model:	YSTM8	YSTMS30	YSTMS35D	YSTM40	YSTMS55D	YSTMSW8	YSTMSW10
Description:	Full range powered monitor speaker pair	3-piece powered speakers & sub-woofer system	3-piece powered speakers & sub-woofer system	Quality desktop pair.	3-piece powered speakers & sub-woofer system	Powered subwoofer	Powered subwoofer wooden cabinet
Watts:	2x 5w	2x 6w speakers, 18w subwoofer	2x 6w speakers, 18w subwoofer	2x 12w speakers	80w speakers, 40w subwoofer	15w	25w
Features:	Ashtons deep bass. Subwoofer and headphone output jacks. Dual stereo inputs.	2" Satellite speakers for brilliant highs. Deep, powerful bass to 45Hz.	USB architecture for superior sound and easy Plug and Play installation.	Dual analogue inputs. Advanced servo Technology for deeper bass.	Deep, powerful bass, brilliant highs. Headphone output jack.	Deep bass. Subwoofer and headphone output jacks. Dual stereo inputs.	Incredible audio depth, auto on/off. Chest-thumping bass response down to 35Hz.
White:	(81339) GST Ex: \$69 +GST: \$6.90 GST Inc: \$75.90	(86029) GST Ex: \$120 +GST: \$12.00 GST Inc: \$132.00	(86031) GST Ex: \$147 +GST: \$14.70 GST Inc: \$161.70	(99555) GST Ex: \$99 +GST: \$9.90 GST Inc: \$108.90	(81345) GST Ex: \$233 +GST: \$23.30 GST Inc: \$256.30	(81348) GST Ex: \$90 +GST: \$9.00 GST Inc: \$99.00	(81350) GST Ex: \$145 +GST: \$14.50 GST Inc: \$159.50
Black:	(81340) GST Ex: \$69 +GST: \$6.90 GST Inc: \$75.90	(86030) GST Ex: \$120 +GST: \$12.00 GST Inc: \$132.00	(86032) GST Ex: \$147 +GST: \$14.70 GST Inc: \$161.70	(99556) GST Ex: \$99 +GST: \$9.90 GST Inc: \$108.90	(81346) GST Ex: \$233 +GST: \$23.30 GST Inc: \$256.30	(81349) GST Ex: \$90 +GST: \$9.00 GST Inc: \$99.00	

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Finance methods
subject to approval

Smart Storage Solutions

Check for
latest prices
& productsZip 250MB
USB

Provides high-capacity storage in an easy-to-use format that can go from desktop to laptop quickly and reliably. Sleek new design. Connect via USB port or through PCMCIA card version which requires no additional power cables. Backward compatible with 100MB Zip media

ZIP 250MB USB:
GST Ex: \$282 + GST: \$28.20
GST Inc: **\$310.40** (82633)

Drive USB/PC card Combo
GST Ex: \$337 + GST: \$33.70
GST Inc: **\$370.70** (82780)

ZIP

Zip
250MB

Portable, light, easy to use and holds more files than ever before! Backwards compatible with 100MB Zip disks. Comes with 1 Zip 250MB disk. Iomega tools supplied on CD.

Parallel:
GST Ex: \$215.00 + GST: \$25.10
GST Inc: **\$276.10** (74450)

SCSI:
GST Ex: \$251 + GST: \$25.10
GST Inc: **\$276.10** (74451)

Disks:
Single
GST Ex: \$19 + GST: \$1.90
GST Inc: **\$20.90** (74454)

10-pack
GST Ex: \$196 + GST: \$19.60
GST Inc: **\$215.60** (74452)

ZIPCD

CD-RW Internal



8 X 8 X 32

Share your personal photos and original audio and video creations with friends and relatives. Also share multimedia presentations and data files with clients and co-workers.

Create a backup for all your files and create lots of space on your hard drive.

Record photos from your digital scanners well as your own original audio creations and play them on most stereo or car CD Players

GST Ex: \$490 + GST: \$49.00
GST Inc: **\$539.00** (A1414)

Zip 100MB disk:
(23772)
GST Ex: \$16 + GST:
\$1.60 GST Inc: **\$17.60**
10-pack:
(21889)
GST Ex: \$158 + GST:
\$15.80 GST Inc: **\$173.80**
Zip PCMCIA SCSI
accelerator card
(35145)
GST Ex: \$146 + GST:
\$14.60 GST Inc: **\$160.60**

Zip ISA SCSI Zoom
accelerator card
(21888)
GST Ex: \$79
+ GST: \$7.90
GST Inc: **\$86.90**

Zip drive carry case
(31823)
GST Ex: \$42 + GST:
\$4.20 GST Inc: **\$46.20**

Zip parallel cable
(46305)
GST Ex: \$35 + GST:
\$3.50 GST Inc: **\$38.50**

Zip SCSI cable
(46304)
GST Ex: \$33
+ GST: \$3.30
GST Inc: **\$36.30**

Zip disk labels 20-pack
(48059)
GST Ex: \$3 + GST:
\$0.30 GST Inc: **\$3.30**

Zip 6-disk wallet
(35146)
GST Ex: \$21 + GST:
\$2.10 GST Inc: **\$23.10**

Jaz 1GB disk (24218)
GST Ex: \$144 + GST:
\$14.40 GST Inc: **\$158.40**

3-pack
(32844)
GST Ex: \$387 + GST:
\$38.70 GST Inc: **\$425.70**

Jaz PCMCIA SCSI card
(44744)
GST Ex: \$206
+ GST: \$20.60
GST Inc: **\$226.60**

Jaz universal power
supply
(35154)
GST Ex: \$44 + GST:
\$4.40 GST Inc: **\$48.40**

Click!Power Supply
(78925)
GST Ex: \$27
+ GST: \$2.70
GST Inc: **\$29.70**

JAZ

Jaz 2GB External



GST Ex: \$545 GST: \$54.50
GST Inc: **\$599.50** (78941)

The external Jaz 2GB drive is faster than many hard drives, has a full 2GB of storage space in each removable disk, gives you the freedom to take your files with you, and is backward compatible with industry standard Jaz 1GB disks. Does not include Jaz disk.

Disk Single:
GST Ex: \$152 + GST: \$15.20
GST Inc: **\$167.20** (61652)

Disk 3-pack:
GST Ex: \$416 + GST: \$41.60
GST Inc: **\$457.60** (57271)

CLIK!

Click! PC Card
Drive

Integrated, high-capacity removable solution for notebook users. Sleek

& compact, fits into most notebooks. Store, protect and share important information on a 40MB Click! disk (not included).

Click! Drive PC Card and disk
GST Ex: \$244 + GST: \$24.40
GST Inc: **\$268.40** (78902)

Click! Drive Mobile
GST Ex: \$277 + GST: \$27.00
GST Inc: **\$304.70** (76743)

Click! Disks 2-pack
GST Ex: \$54 + GST: \$5.40
GST Inc: **\$59.40** (75984)

Click! Disks 10-pack
GST Ex: \$168 + GST: \$16.80
GST Inc: **\$184.80** (75985)

NEW

USB 100MB ZIP
STARTER KIT
WITH 3 DISKS

Coming in July Iomega will release the Zip USB 100 Starter Kit. This comes equipped with the drive as well as 3 x 100 zip disk

USB Easy to connect. Plug it in, connect the USB cable to the computer, and install the IomegaWare™ software. Done!

Call for pricing

See www.ht.com.au/cat/iomega for more info on these products

Sales: 1300 13 9999
Fax: 1300 13 6666

Website: www.ht.com.au
E-mail: sales@ht.com.au

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from 1st July 2000.

Professional Video Tools

Fly Buys.
Collect
Fly Buys
points on
your
computer
hardware &
software
when you
purchase
from Harris
Technology.

**Wine
on-line?**
**VINTAGE
CELLARS**
vintagecellars.
com.au

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Pricing
valid
from
1st July
2000

JUL
34

canopus EZDV

From the makers of the award winning DV Raptor:
Fast, Friendly and Easy DV Editing for your desktop.



GST Ex \$592
+ GST \$59.20
(97877) GST INC

\$651.20

- Rock Solid DV Codec - Only from Canopus
- Compatible with DV and Digital8 cameras
- Frame accurate camera control
- Easy to learn and use EZEedit software (included)
- Captures selected clips or complete videotapes
- High speed rendering
- SoftXplode 2D and 3D special effects software (included)
- High Speed filtering and image enhancements

DV Raptor



GST Ex \$1,237
+ GST \$123.70
(89050) GST INC

\$1,360.70

The DV Raptor bundle includes:
the award winning DV Raptor
Premiere, SoftXplode:
keyframeable 2D & 3D effects
• Raptor Edit: a powerful video editor
with real-time "assemble" and "insert"
editing and near-real-time transition
and title authoring • SmartSound,
soundtrack creation software. Impact3D
and Adorage software. ** PLUS ** Raptor
Bay and all the traditional high quality
utilities that have made DV Raptor
Australia's best selling DV editing system.

DV Rex

GST Ex \$4,800
+ GST \$480.00
(89053) GST INC

\$5,280.00



- Native DV Editing
- DV I/O • Analog I/O
- High Speed Hardware and Software Codec • Multiprocessor Support

DV Rex Mega Bundle



GST Ex \$6,236.00
+ GST \$623.60
(89056) GST INC

\$6,859.60

This great bundle includes the DV Rex,
DVRexRT real-time module & Xplode
graphics card. • High quality keyframeable
effects • Realtime static and moving titles
• High Quality Luminance keying • Colour
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tracks for real time titling • High Speed video
effects • 200 customizable alpha transitions
• 50 thematic objects • 50 thematic
transitions • Import models created in
3Dstudio or 3Dstudio MAX.

Matrox RT2000

Professional Realtime Editing for
corporate, event and multimedia artists

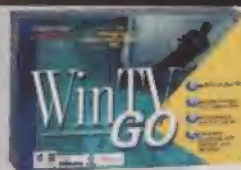


GST Ex \$2,498
+ GST \$249.80
(89082) GST INC

\$2,747.80

- Dual-stream video editing, 32-bit
graphics • Realtime broadcast-quality
3D DVE • Native-DV and MPEG-2
editing • 1394, Y/C, and
composite I/O • MPEG-2
output for DVD and CD
authoring • MPEG-1 and
RealVideo output for web
streaming • Matrox
Millennium G400 high-
performance desktop display card
• Complete content creation software bundle-
Adobe Premiere RT 5.1, Ulead Cool 3D,
Sonic Foundry ACID Music, Sonic DVDIt!

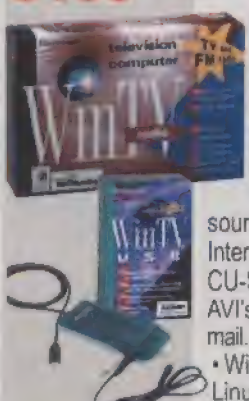
Hauppauge TV (Win TV GO)



GST Ex \$151.00
+ GST \$15.10
(89063) GST INC

\$166.10

- Watching Television on your
computer has never been easier
with WinTV • Watch Live TV or
video on your PC while surfing
the Web. (in a window or full
screen). • Channel surf 16
channels at once
• Professional teletext reception. DDE
(export data from teletext to your
spread sheet), print, save and more
• Capture video images, motion
video. High quality video still
capture 1600x1200 pixels, GIF,
JPEG formats, AVI's and send
them to friends via e-mail. • Video
clip capture in Microsoft AVI file
format - from TV or any video
source • Video conference over the
Internet with Microsoft NetMeeting or
CU-SeeMe. • Create home movie
AVI's and send them to friends via e-
mail.
• Win 95, 98, NT 4.0, Win2000 and
Linux.



GST Ex \$195 + GST \$19.50 (89064) GST INC

\$214.50

Win TV GO- FM

GST Ex \$280 + GST \$28.00 (89065) GST INC

\$308.00

Win TV Radio

GST Ex \$232 + GST \$23.20 (89066) GST INC

\$255.20

Win TV USB (connect in seconds)

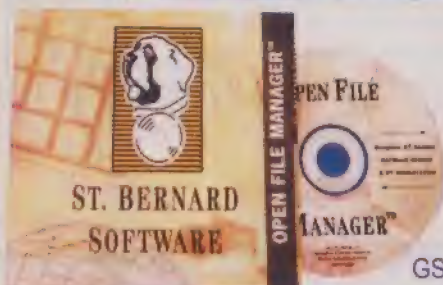
GST Ex \$290 + GST \$29.00 (98455) GST INC

\$319.00

Win TV USB (with FM Radio)

Next Generation Backup Solutions

Open File Manager



GST Ex \$920
+ GST \$92.00

(97770) GST INC **\$1,012.00**

Your back up systems play a critical role in your company's operation. Unfortunately there is a gap in every NT and Netware backup program. Most backup programs don't even attempt to include open email, databases, web server or other files. That's where St. Bernard Software's Open File Manager comes in. It is the only utility that allows all major backup programs to consistently capture the mission critical open files at any time. Open File Manager (OFM) ensures a complete and accurate backup, reliably and easily, even if the files are in use.

Backup Software - TapeWare



TapeWare Lite:
Single Server
backup for NT,
Netware or Linux

GST Ex \$425
+ GST \$42.50

(97849) GST INC **\$467.50**

TapeWare - Loaded with features yet simple to use. TapeWare is simple to install and easy to administer whether you have a single PC or a large enterprise network.

- Quick Start Wizards set up most common applications quickly
- Advanced and predefined scheduling features
- Built in free 6 slot autoloader support
- Desktop, Single Server, Enterprise and Data Centre Versions
- Options for MS-Exchange, Cluster, SQL, SAN etc

More from
Digital Tape
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GST Ex \$3,041
+ GST \$304.10
(70917)
\$3,343.10

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DLT7000/ST.
GST Ex
\$6,842
+ GST \$684.20
(41608)
GST INC
\$7,526.20

Quantum
DLT8000/ST
GST Ex
\$6,896
+ GST \$689.60
(82501)
GST INC
\$7,585.60

DLTape media
DLT2000XT 15/
30GB Tape
GST Ex \$73
+ GST \$7.30
(68362)
GST INC
\$80.30

DLT4000 20/
80GB Tape
GST EX \$128
+ GST \$12.80
(71231)
GST INC
\$140.80

DLTclean
Cleaning Tapes
GST Ex \$73
+ GST \$7.30
(97851)
GST INC
\$80.30

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ECRIX VXA-1 Tape Drive

INTERNAL GST Ex \$1,558 + GST \$155.80 (91106)

GST INC **\$1,713.80**

EXTERNAL GST Ex \$1,649 + GST \$164.90 (91110)

GST INC **\$1,813.90**



- 33 GB Native, 66GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hour
- SCSI-2 and LVD models available.
- Variable speed operation matches data throughput to your computer
- Packet based technology guarantees reliable restores
- LINUX approved
- Variety of case colours (*White, black, red, translucent)
- Compatible with most backup software



Benchmark DLT Tape Drive



INTERNAL

GST Ex \$2,915

+ GST \$291.50 (88037)

GST INC **\$3,206.50**

EXTERNAL GST Ex \$3,125 + GST

\$312.50 (88038) GST INC

\$3,437.50

- 40GB native, 80GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hour
- Ultra Wide SCSI LVD interface
- Reads DLT4000 tapes (20/40Gb Only)
- Internal or External models
- LINUX Approved
- 7 tape autoloader available
- Compatible with most common backup software
- Standard DLT form factor

SONY MEDIA



12 x CDR 74min
GST Ex \$17
+ GST \$1.70
GST INC
\$18.70
(26680)



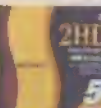
12 x CDR 74min
GST Ex \$22
+ GST \$2.20
GST INC
\$24.20
(97902)



4x CDRW
74 min
GST Ex \$7
+ GST \$0.70
GST INC
\$7.70
(91467)



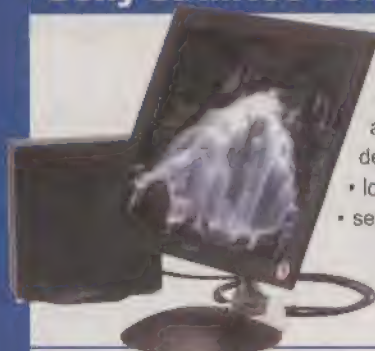
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Floppy Discs
IBM Formatted
GST Ex \$7
+ GST \$0.70
GST INC
\$7.70
(A0151)



Box of 10
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Floppy
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GST \$0.70
GST INC
\$7.70
(15972)

Brand new state-of-the-art Monitors

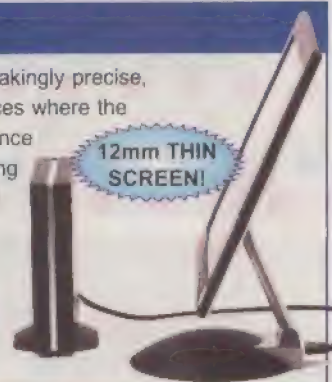
Sony SDM50 Colour Monitor



The SDM50 is ultra-thin, bold, and breathtakingly precise. The Sony Flat Panel Display delivers in places where the others can't. Provides cutting-edge performance and technology in a breakthrough space-saving design • 15" XGA TFT Active Matrix LCD Panel • low profile, easy-tilt design, black matte finish • separate ultra-thin screen and media box.

GST Ex \$2,531 + GST \$253.10 (97422)

GST INC **\$2,784.10**



12mm THIN
SCREEN!

Sony CPDE200 17"FD Trinitron

Sony offers outstanding image quality with reduced glare and no picture distortion by utilising the latest unique Trinitron innovation - the FD Trinitron Multiscan CRT • 17" (16" viewable) • .24" .25 aperture grille • high contrast anti-reflective coating • 1280 x 1024 @ 75Hz maximum resolution.

FD Trinitron

GST Ex \$688 + GST \$68.80

(84022) GST INC **\$756.80**

Sony's 3 Year On-
Site Warranty
*Conditions Apply



Sony Digital Mavica MVCFD90 Floppy Disk Digital Camera

Removable 3.5" 2HD floppy disk storage media • 1.3 mega pixel CCD interface • SXGA (1280x960), XGA (1024x768), VGA (640x480 pixel) resolution • Up to 30 images per 1.44MB floppy disc/1,272 per 64MB memory stick with optional MSACFD2M adaptor • 2.5" colour LCD • 560g • Voice Memo mode (up to 40 secs).

GST Ex \$1,587 + GST
\$158.70 (A0801) GST INC

\$1,745.70 Ask about other Sony Mavica models!!



Digital Mavica™

CRX140EBK CD-R/RW kit 8x write, 4x rewrite, 32x read

This IDE interface drive ships complete with everything you need to get started. Includes interface and audio cables, mounting screws, Adaptec CD Creator V4 (Win 2K compat.) & CD Direct V3 s/w installation and user manuals PLUS one CD-R and one CD-RW disk.

GST Ex \$433 + GST \$43.30
(88568) GST INC

\$476.30



* SCSI Host Adaptor card not included
(97411) GST INC

GST Ex \$553 + GST \$55.30

\$608.30

CD-RW Drive CRX145SBK MAX Performance CD-RW Kit

The CRX145 offers MAXimum performance speed with the latest 10X recording technology, 32X playback and 4X RW. This high performance drive features SCSI interfacing and custom Sony Laser technology. A large 4MB buffer and special 4X audio mode combine for accelerated recording and anti-skip playback. Supplied as a kit with everything* required for installation & operation including cables, media, Adaptec CD Creator V4 (Win 2K compatible!) & DirectCD V3 s/w. New Preformatted media saves up to an hour in set up time.

IDE version
GST Ex \$507
+ GST \$50.70 (97409)
GST INC **\$557.70**

Preformatted
media saves
up to 40mins
set-up time!



Backup solutions from the leader in tape technology

Storage by Sony® Proven reliability has made DDS the #1 format for backup & off-line file storage. Small, inexpensive tapes store from 2 to 20GB native while DCLZ compression can effectively increase this by as much as double. Sony developed the DDS format and remains the leading manufacturer of drives and media. Sony's Advanced Intelligent Tape format takes Tape technology to its peak. Individual cartridges hold up to a massive 150GB compressed while drives are designed to be virtually maintenance free. If you want a format that offers MAXIMUM capacity, MAXIMUM reliability and MINIMUM cost of ownership you can't surpass AIT.

Sony SDX500C AIT-2 Drive

Advanced Intelligent Tape-2

**50 - 150GB
Capacity!**



- 36/50GB native capacity per tape
- Latest ALDC compression hardware (up to 3:1)
- 6MB/s native, up to 18MB/s compressed transfer!
- Dual Spindle cartridge with unique MIC technology
- AME recording surface re-usable over 30,000 times!
- SCSI Ultra Wide interface
- 3 year warranty with Free on-site exchange

Internal SDX500C

GST Ex \$5,375 + GST
\$537.50 (88586)

GST INC **\$5,912.⁵⁰**

External SDXS500C

GST Ex \$5,998 + GST
\$599.80 (80636)

GST INC **\$6,597.⁸⁰**

Tape Backup Kits from Sony

Sony is pleased to offer a complete solution for all your backup requirements. Our new solution kits include:

- Interface Cable
- Easy Install Guide
- Mounting screws (Internal only)
- 1 Media tape
- 3 1/2 & 5 1/4" faceplates (internal only)
- Terminator (Ext. only)
- 3 year warranty with Free on-site exchange

Top selling backup software for
Workstation and Server installations



OR



PC Workstation Kit Solutions - PC's running

Win 3.1/95/98, NT Workstation or OS/2

DDS-2 Kit 4-8GB

Internal SDT7000K

GST Ex \$1,152 + GST \$115.20

(84341) GST INC **\$1,267.²⁰**

External SDTS7000K

GST Ex \$1,372 + GST \$137.20

(88572) GST INC **\$1,509.²⁰**

DDS-3 Kit 12-24GB Internal SDT9000K

GST Ex \$1,482 + GST \$148.20

(88573) GST INC **\$1,630.²⁰**

External SDTS9000K

GST Ex \$1,808 + GST \$180.80

(88574) GST INC **\$1,988.⁸⁰**



PC Server Kit Solutions - For servers running

Windows NT server with up to 250 users or Netware up to 25 users
(upgrades/crossgrades enable larger installations to be supported).

DDS-3 Kit 12-24GB

Internal SDT9000KN

GST Ex \$2,153 + GST \$215.30

(91462) GST INC **\$2,368.³⁰**

External SDTS9000KN

GST Ex \$2,390 + GST \$239.00

(91464) GST INC **\$2,629.⁰⁰**

AIT-1 25/35-75/105GB

Internal SDX300K

GST Ex \$3,621 + GST \$362.10

(88583) GST INC **\$3,983.¹⁰**

External SDXS300K

GST Ex \$3,950 + GST \$395.00

(88584) GST INC **\$4,345.⁰⁰**



**DDS-4 &
AIT-2 also
Available**

SONY TAPES

SDX1-25C

GST Ex \$140 +
GST \$14.00
GST INC

\$154.⁰⁰

(64336)

SDX1-35C

GST Ex \$179 +
GST \$17.90
GST INC

\$196.⁹⁰

(88719)

SDX2-50C

GST Ex \$205 +
GST \$20.50
GST INC

\$225.⁵⁰

(95749)

DGD150P

GST Ex \$69
+ GST \$6.90
GST INC

\$75.⁹⁰

(A1302)

DGD125P

GST Ex \$37
+ GST \$3.70
GST INC

\$40.⁷⁰

(A1303)

DGD120P

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GST INC

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(A1304)

DG90P

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+ GST \$0.80
GST INC

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(A1305)

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GST Ex \$2,573 + GST \$257.30

(83652) GST INC **\$2,830⁻³⁰**

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worth \$199



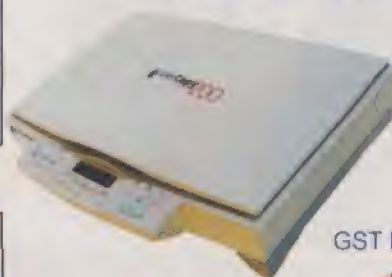
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4 ppm
colour

Standard
Ethernet

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DeskLaser Plus**

Turn your colour laser into a
colour photocopier



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capability can be
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QMS Printers, with
the Minolta-QMS
ScanCopier 200.

GST Ex \$793 + GST \$79.30

(83589) GST INC **\$872⁻³⁰**



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Standard
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Option

Oversize
A3

GST Ex \$7,529
+ GST \$752.90
(99572) GST INC

\$8,281⁻⁹⁰

**6100 A3
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Computer
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when you
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from Harris
Technology.

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B&W
Printer

1200x600dpi

250 sheet
tray

Postscript
2

**PagePro
18L**



GST Ex \$1,196 + GST \$119.60

(A1417) GST INC **\$1,315⁻⁶⁰**

Fast &
Inexpensive

10ppm
B&W
Printer

600x600dpi

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Port

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1100L**



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(A1438) GST INC **\$574⁻²⁰**

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150P 15.1" LCD XGA Monitor

GST Ex: \$1,800
+ GST: \$180.00

(94489) GST Inc:

\$1,980.00



NEW
PRODUCT



- Award Winner! Review from PC Authority April 2000 edition.
- Best resolution of 1024 x 768
- "This was one of the top five in terms of quality and it exhibited no serious deficiencies. When discussing a 'complete' product, this is it, since it provides everything you could need in a TFT screen at a very reasonable price. Compatible with PC & Mac system and is ready for the upcoming DVI-D digital display. For multimedia users, the 150P features 2 x 1W stereo speakers, as well as a centrally-located microphone."

PC Authority: April 2000 edition.



Vesta Camera

GST Ex: \$144
+ GST: \$14.40

(A1191) GST Inc:

\$158.40

USB PC Camera - Vesta

USB Connection for true plug and play with Windows 98/2000 PC. Draws power from PC/USB hub. Supplied with image capture & Videogram software. Snapshot Button for capturing still shots from the desktop. Max Resolution 640x480 @ 15fps Perfect for desktop conferencing, Internet and video mail.



107P 17" CRT Monitor

GST Ex: \$761
+ GST: \$76.10

(96590) GST Inc:

\$837.10

NEW
PRODUCT

Plug
and
Play



- Award Winner! Review from PC World April 2000 edition.
- The 17-inch (16.0" VIS) Brilliance 107P Real Flat monitor with a 0.25 mm Aperture Grille tube has a maximum horizontal frequency of 96 kHz.
- Optimal resolution of 1024 x 768 at 75Hz flicker free display
- Dual input: VGA 15pin D-Shell or 5 x BnC
- TCO99 & MPRII low emission standards



201B 21" XSD Monitor

GST Ex: \$1,545
+ GST: \$154.50

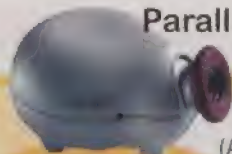
(44852) GST Inc:

\$1,699.50

NEW
PRODUCT



- 21" (20" VIS) colour monitor with excellent front of screen performance for use with PC's or Workstations.
- Autocan covers horizontal frequencies up to 107KHz
- Flat Square Super High Contrast CRT with high resolution 0.25mm dot pitch
- Auto Calibrate extends the life of the monitor by automatically adjusting colour and luminance to original values.
- Optimal resolution of 1600 x 1200 at 75Hz flicker free display
- TCO99 & MPRII low emission standards



Parallel Port PC Camera

GST Ex: \$176
+ GST: \$17.60

(A1190) GST Inc:

\$193.60

Connects via Parallel Port. Supplied complete with cable, power supply, image capture & videogram software. 1/4" CCD Optical System, Max Resolution 320 x 240 @ 15fps Perfect for Internet or video mail.
Note: Not for Windows NT 4.0

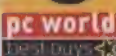


Vesta PRO Camera

GST Ex: \$176
+ GST: \$17.60

(A1192) GST Inc:

\$193.60



USB Connection for true plug and play with Windows 98/2000 PC. Draws power from PC/USB hub. Supplied with image capture, video editing & Videogram software. Max Resolution 640x480 @ 30fps. Snapshot Button for capturing still shots from the desktop. This product allows 'real time' video capture at NTSC quality with a suitable PC configuration. Perfect for desktop conferencing, Internet and video mail.

MMS280 Stereo Speakers With Active Subwoofer



GST Ex: \$159
+ GST: \$115.90

(72844) GST Inc:

\$174.90

- Active 40W (RMS) 2 speaker
- Plus Subwoofer System
- 480W PMPO
- Frequency Range 35-20,000 Hz
- Incredible Surround and
- Dynamic Bass Boost features

DSS350 USB Stereo Speakers



GST Ex: \$134
+ GST: \$13.40

(72845) GST Inc:

\$147.40

Uses the USB port with Win 98/2000 PC's - no sound card required. Uses Self Oscillation Class D Amplifier Delivering 30W (RMS) 360W PMPO Line In jack for Analogue Support. Incredible Surround and Dynamic Bass Boost features.

DSS370 USB Stereo Speakers With Active Subwoofer



GST Ex: \$252
+ GST: \$25.20

(72847) GST Inc:

\$277.20

All the benefits of DSS350 with Active Subwoofer included. Frequency Range 35-20,000 Hz System Power 60W RMS 720W PMPO Uses the USB Port on a Win98 or Win2000 PC - no sound card needed.

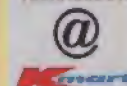
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Laser
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Wine
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HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the LJ 1100 into an all-in-one performer when your business needs grow. Crisp, sharp 600dpi laser printing. 8ppm. 2MB RAM.

GST Ex \$671 + GST \$67.10 (70095) GST INC

\$738.¹⁰



HP LaserJet 1100A Printer-Copier-Scanner

If your current business needs require the LaserJet 1100 with copying & scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Make laser copies at the touch of a button. Scan resolution 600dpi enhanced, 300dpi optical.

GST Ex \$758 + GST \$75.80 (70096) GST INC

\$833.⁸⁰



HP LaserJet 2100 Series

All models feature:

- 1200dpi resolution
- 10ppm print speed
- 60MHz processor
- 350-sheet capacity
- 15,000 page monthly duty cycle
- Excellent performance

LaserJet 2100

GST Ex \$1,139 + GST \$113.90

A fast flexible laser with room to grow. (72291) GST INC

\$1,252.⁹⁰

LaserJet 2100M

GST Ex \$1,319 + GST \$131.90

A fast flexible laser with PS and PCL (72292) GST INC

\$1,450.⁹⁰

LaserJet 2100TN

GST Ex \$1,551 + GST \$155.10

A complete network printer, EIO, PCL 6, (72293) GST INC
8MB RAM, additional 250-sheet feeder, HP JetDirect print server installed.

\$1,706.¹⁰



HP LaserJet 4050 Series

All models feature:

- 1200dpi resolution
- 16ppm print speed
- 133MHz processor
- 500-sheet capacity

LaserJet 4050

GST Ex \$1,953 + GST \$195.30 (77443)

PCL 6, 8MB RAM.

GST INC

\$2,148.³⁰

LaserJet 4050N

GST Ex \$2,357 + GST \$235.70 (77445)

PCL 6, 16MB RAM.

GST INC

\$2,592.⁷⁰

LaserJet 4050TN

GST Ex \$2,837 + GST \$283.70 (77446)

PCL 6, 16MB RAM

GST INC

\$3,120.⁷⁰



HP Professional

Colour InkJet Printers



HP 2000 Series: Business performance with break-through colour print speed. Black: 600dpi, 10 ppm. Colour: PhotoREt II, 4ppm. Low printing costs. Four individually replaceable ink cartridges. Outstanding quality. 5,000 pages monthly duty cycle. 2MB RAM.

2000C Excellent colour print quality for a great price! GST Ex \$795 + GST \$79.50 (69484) GST INC

\$874.⁵⁰

2000CN Network ready, additional 250 sheet paper tray

GST Ex \$1,399 + GST \$139.90 (69485) GST INC

\$1,538.⁹⁰

HP 2500 Series: Fast, brilliant colour printing for the workgroup. **A3 capable.** Black: 600dpi, 9ppm. Colour: 3.5ppm. Rugged and robust. Low cost per page. 4 individually replaceable ink cartridges. Versatile media handling. 12,000 pages monthly duty cycle.

2500C 4MB RAM

GST Ex \$1,777 + GST \$177.70 (70725)

GST INC

2500CM RAM

GST Ex \$2,570 + GST \$257.00 (76060)

GST INC

\$2,827.⁰⁰



HP Colour LaserJet 4500 Series

Delivers high quality 600dpi colour graphics. 16ppm mono, 4ppm colour. 32MB RAM. 133 MHz processor. 900 pages input. Superior network management. Duplex capable. Automatic transparencies sensing. Reliable and cost-effective. Improved paper handling.

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GST INC FROM **\$4,895.⁰⁰**



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Stunning Performance...

Phaser 740 Laser Printer

Never Say Never



740: Affordable colour laser printer with extraordinary print quality. For breathtaking images that leap off the page, at a breakthrough colour laser price, look to the Phaser 740. That way, you'll never have to compromise.

Phaser 750 Laser Printer

750: The NEW Phaser 750 brings affordable, high quality colour printing within reach of all businesses - a revolutionary idea. The Phaser 750 colour printer improves upon the award-winning Phaser 740 colour printer, with increased printing and processor speeds and improved colour quality. A new, faster 200 MHz processor delivers 16 pages per minute black-and-white prints or 5 ppm colour prints.



Tektronix	Phaser 740	Phaser 750N
Full colour printing	Standard	Standard
Max resolution black/colour	1200dpi/600dpi	1200dpi/1200dpi
Ram Standard/Max	32MB/256MB	64MB/256MB
Image Processor	133Mhz	200Mjhz
Print Speed black/colour	16ppm/5ppm	16ppm/5ppm
Pipeline Printing	Optional	Optional
Duplex Manual	Standard	Standard
Auto	Optional	Optional
	(71836) GST Ex: \$3930 + GST: \$393.00 GST Inc: \$4,323.00	(A1401) GST Ex: \$4,997 + GST: \$499.70 GST Inc: \$5,496.70

Tektronix
Phaser 740
Toner

Black

(71854)
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+ GST: \$16.80
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740N Printer feature: 10BaseT Network-ready printing right out of the box
750N Printer feature: 10/100BaseT Network-ready printing right out of the box
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A4 BJC-3000

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(94499) GST INC

\$254¹⁰

- Up to 9ppm print speed black
- 1440 dpi
- Separate replacement colours



A3/A4 BJC- 6500

GST Ex \$563 +
GST \$56.30
(95962) GST INC

\$619³⁰



LBP1000

10 pages per minute print engine at 1200 dpi resolution. Energy saving 'On-Demand' toner fusing. Cost-saving 'economy' printing mode. Powerful processor to ensure maximum throughput. Memory Saving Technology to accomplish more in less RAM. PCL6 Print Language emulation. Optional genuine Adobe® PostScript® 3™ printer language. Optional second 250 sheet paper feeder. Maintenance free 'all-in-one' toner and drum cartridge. 4 MB RAM standard - upgradeable to 36 MB.



GST Ex \$1,053 + GST \$105.30

(95983) GST INC **\$1,158³⁰**

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BJC-265SP

Super Economy mode:
cartridges deliver up to 400
pages in colour, 2400 in black.
Up to 4ppm in black, up to
0.3ppm colour.
Banner printing capable.



GST Ex
\$109
+ GST \$10.90
(76009) GST INC

\$119⁹⁰

BJC-2000SP

Super Economy mode: 3,600
black text pages. Prints up to
5 ppm for black text and up to
2ppm for colour. Photo mode
on plain paper. Optional
PhotoRealism photo printing.
Banner printing capable.
Optional colour scanner head.



GST Ex \$144 + GST \$14.40
(80926) GST INC

\$158⁴⁰

BJC-8200

Photographic printing quality
1200 x 1200 dpi,
PhotoRealism 6 colour
printing. Separate ink tanks for
each colour with level
detection system. Optional
scanning at 600 dpi. Parallel
connectivity for Win® 95/98 &
NT 4.0 USB connectivity for
pre-installed Windows.



GST Ex \$566 + GST \$56.60
(95964) GST INC

\$622⁶⁰

LBP800

Desktop laser, 8ppm,
300x300dpi, 600x600dpi
and 2,400dpi with text and
line smoothing. 512K
buffer. 2,500 pages per
cartridge (5% cover).
Win® 95, 98 and NT 4.0.



GST Ex \$468
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\$514⁸⁰

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GST INC

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GST \$16.30
(83673) GST INC

\$179³⁰

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opt. res. GST Ex
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(83685) GST INC

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BJC-85



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(A0993) GST INC

\$356⁴⁰



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Z11 Color Jetprinter

Print photos, cards, and
banners, all at a great price.
(1200x1200 dpi/4ppm
black/2.5ppm color)



(91535)
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GST: \$12.70
GST Inc.

\$139.⁷⁰

Z31 Color Jetprinter

Print on a wide variety of
media from envelopes and
greeting cards to iron-on
transfers and banners.



(84604)
GST Ex: \$265 +
GST: \$26.50
GST Inc.

\$291.⁵⁰

Z51 Color Jetprinter

Busy? Print faster with the
Z51 Color Jetprinter, a top
of the line printer, for
business or home.



(84605)
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3200 Color Jetprinter

A desktop inkjet with
excellent text quality and
vibrant color output at an
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(74464)
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GST: \$19.40
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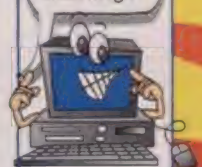
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GST INC
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Colour Ink for
EPSON
STYLUS
COLOR 480
GST Ex \$32
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(A0726)
GST INC
\$35.²⁰

DBL Black Ink
for EPSON
STYLUS
COLOR 670
GST Ex \$70
+ GST \$7.00
(90625)
GST INC
\$77.⁰⁰

Tri-Colour Ink
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STYLUS
COLOR 670 &
760
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(70092)
GST INC
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Black Ink for
EPSON
STYLUS
COLOR 760
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GST INC
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Toner for
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LASER
EPL-5700L
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(65069)
GST INC
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Makes bright ideas look brilliant

EPSON STYLUS COLOR 480

GST Ex \$168.00
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(A0409)
GST INC

\$184.⁸⁰

The EPSON STYLUS COLOR 480 brings the quality and performance of our PerfectPicture Imaging System within everyone's reach. It offers the fine-grained detail of Ultra Micro Dot printing, and the speed and beauty of Variable-Sized Droplet technology. With its user-friendly on-screen display, you control all printer functions right from your PC! Exclusive to Windows only.

EPSON STYLUS COLOR 760

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this printer.

GST Ex \$390
+ GST \$39.00
(A1451)
GST INC **\$429.⁰⁰**

The new EPSON STYLUS COLOR 760 incorporates the latest state-of-the-art technology to ensure it is right at home meeting the demands of the advanced home and office user. By combining EPSON's Advanced Variable-Sized Droplet technology and Ultra Micro Dots with EPSON's award winning PerfectPicture Imaging System, the EPSON STYLUS COLOR 760 has created a new standard of image quality for the SOHO environment. Produces images that are so fine-grained, they are virtually indistinguishable from photographs.

* Offer valid until 31-07-00

EPSON STYLUS COLOR 670

GST Ex \$282.00
+ GST \$28.20
(94835)
GST INC

\$310.²⁰

The EPSON STYLUS COLOR 670 is ideal for home, school and office use. It provides easy, plug-and-play support for Windows 95/98/2000/NT 4.0 and USB-equipped Macintosh systems. It comes with everything you need to print 1440dpi photo quality colour images from the moment you set it up. What's more, it offers the outstanding performance of EPSON's PerfectPicture Imaging System and Variable-Sized Droplet technology — at a remarkably affordable price.

EPSON DESKTOP LASER EPL-5700L

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+ GST \$67.20
(65064)
GST INC

\$739.²⁰

The EPSON EPL-5700L is the ideal laser printing solution for small business and home offices, as well as for personal use in large companies. It gives you exactly what you want from a laser printer — high quality — with highly detailed 1200 dpi class resolution. Plus quick 8 ppm output, convenient operation and a USB interface for compatibility with both Windows and G3/iMac computers.

Epson Model	480	670	760	EPL-5700L
Print Method	Piezoelectric	Piezoelectric	Piezoelectric	Piezoelectric
Print Speed Colour (econ mode)	2.6ppm	3.8ppm	6.8ppm	-
Print Speed Black (econ mode)	4ppm	5ppm	7ppm	8ppm
Print Resolution	720x720	1440x720	1440x720	600 or 300dpi
Paper holding capacity				
Plain 100 shts	100 sheets	100 sheets	100 sheets	150 sheets
Epson Transparency	1 sheet	10 sheets	20 sheets	-
Envelopes	10 env	10 env	10 env	yes optional 500 sheet tray



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- Universal Serial Bus (USB) connector



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(81725) GST INC

\$216⁷⁰

HP ScanJet 6300C

Best image quality for
professionals

- 1200dpi optical Unltd enhanced
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- 36 bit colour
- 5 front panel buttons
- 35mm Slide Adapter.



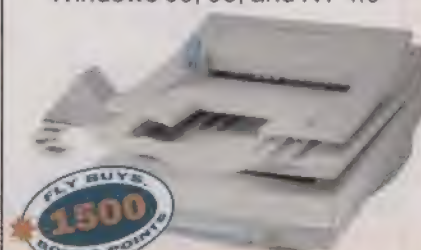
GST Ex \$630 + GST \$63.00 (81726)

GST INC **\$693⁰⁰**

HP ScanJet 6350C

Fast scanning for multi-page
documents

- 1200 dpi optical resolution, 1200 x 2400 hardware resolution, unlimited enhanced resolution
- Scaling: Unlimited Maximum document size: 8.5 x 11.7 inches (216 mm x 297 mm)
- Interface: Universal Serial Bus (USB) - Windows 98; SCSI - Windows 95, 98, and NT 4.0



GST Ex \$790 + GST \$79.00 (81727)

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HP DeskJets

HP DeskJet 930C

Compact Photo- Quality
Colour InkJet Printer

- Alternative 2400x1200dpi mode on photo paper with HP PhotoREt 3
- Excellent results on all types of media in all modes
- Prints up to 9ppm black and 7.5ppm colour



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GST INC **\$389⁴⁰**

HP DeskJet 970Cxi

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printer for professionals

- Up to 2400dpi InkJet with HP PhotoREt 3.
- Up to 12ppm print speed (black) and up to 10ppm (colour)
- New! Automatic two-sided printing



GST Ex \$613 + GST \$61.30
(84363) GST INC

\$674³⁰

HP DeskJet 1220C

High Performance Wide-
Format InkJet Printer for All
Business Needs

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- Prints up to 11ppm black and 9.5ppm colour
- Prints a wide range of sizes- from postcard (4"x6") to poster (13"x19") on a variety of media



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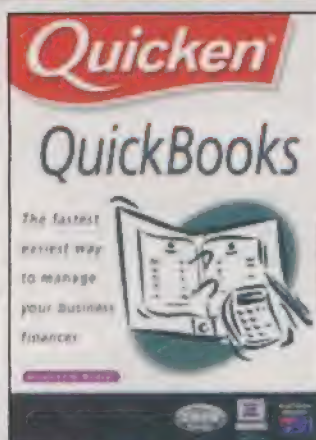
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QuickBooks



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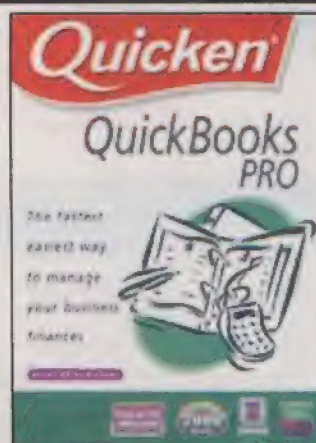
- Manages small business finance
- Invoicing and debt management for small business
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(94375) GST Inc: **\$191.40**

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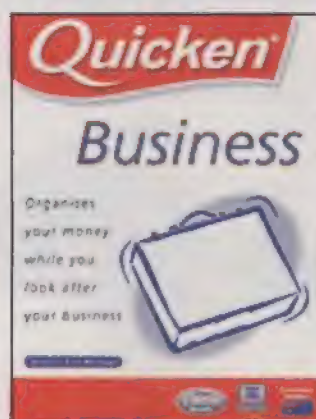
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- Cheque and credit card account reconciliation
- Flexible and customisable reporting
- 90 Reports and graphs
- Cheque preparation and printing
- Sales Tax calculation
- Estimated for better quoting
- Time tracking/ on-screen timer

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GST Ex: \$159 + GST: \$15.90
(85770) GST Inc: **\$174.90**



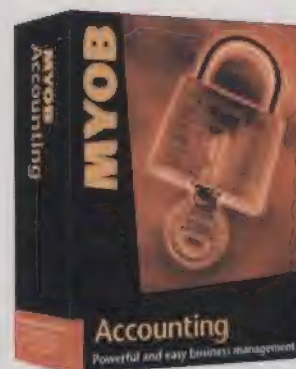
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MYOB Accounting

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Compatible with Win 95/98 or later, NT 4.0 or later, Mac OS 8.0 or later.

GST Ex: \$319 + GST: \$31.90
(85771) GST Inc: **\$350.90**



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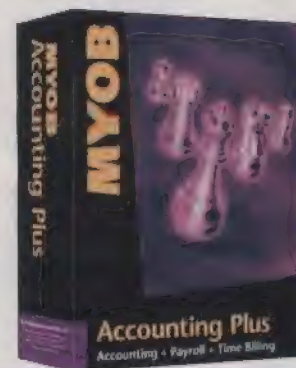
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MYOB Accounting Plus

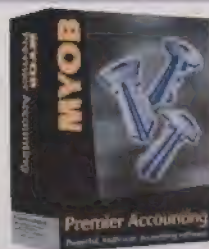
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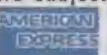
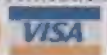
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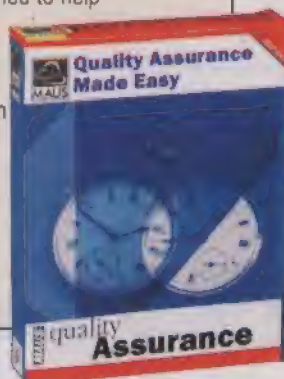
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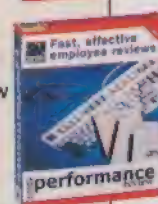
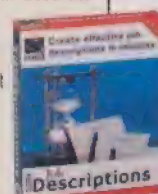
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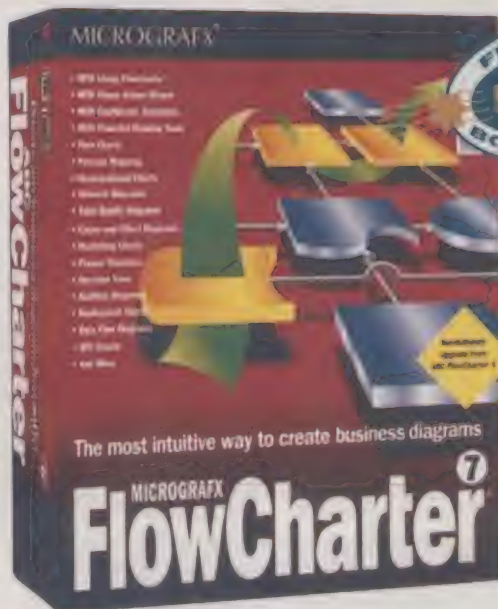
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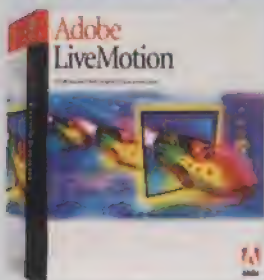
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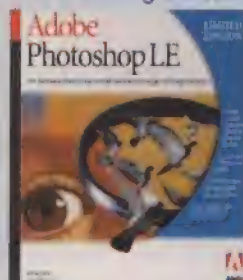


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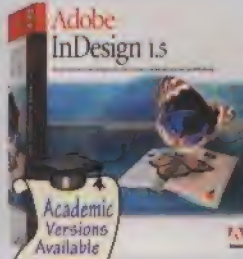


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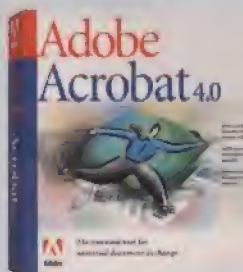


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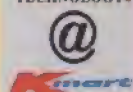
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The Complete Solution for your Web Design Needs.

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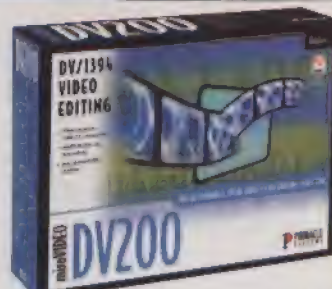


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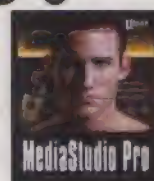


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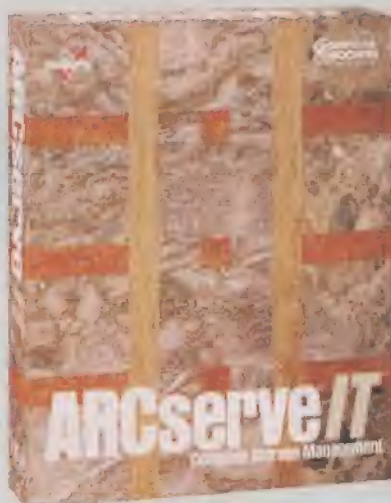
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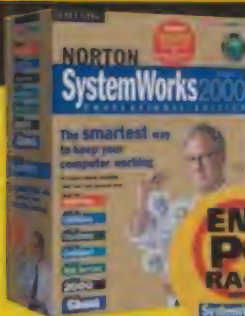
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Norton SystemWorks 2000 3.0 Professional

Fully-integrated and market-leading utility suite with advanced tools for PC experts. Includes: Norton AntiVirus 2000 6.0, Norton Utilities 2000 4.5, Norton CrashGuard 2000, Norton CleanSweep 2000 4.7, Norton Web Services, Norton 2000 (Year 2000 readiness), Norton Ghost (disk/file cloning) plus free Bonus Pack: Norton Secret Stuff, WinFax Basic Edition and Zip-It.



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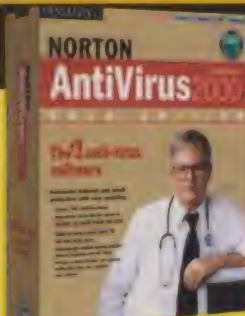
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Norton AntiVirus 2000 6.0 Gold

Makes downloading files off the Internet safer than ever before.

- Monitors your systems in the background to prevent virus entry
- Easy automatic online updates
- Guaranteed satisfaction

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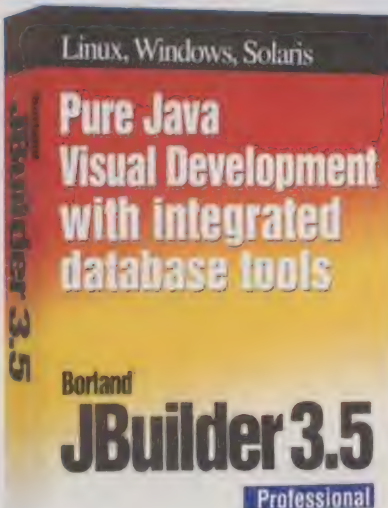
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JBuilder 3.5

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JBuilder 3.5 Enterprise is the most comprehensive set of award-winning visual development tools for creating Pure Java applications, applets, JSP/Servlets, JavaBeans, Enterprise Beans, and distributed CORBA applications for the Java 2 Platform. JBuilder features the unmatched AppBrowser environment with project manager, graphical debugger, CodeInsight coding wizards, extensible code editor, Pure Java Two-Way-Tools™, visual JFC/Swing designers, BeansExpress, DataExpress, and lightning-fast compiler.



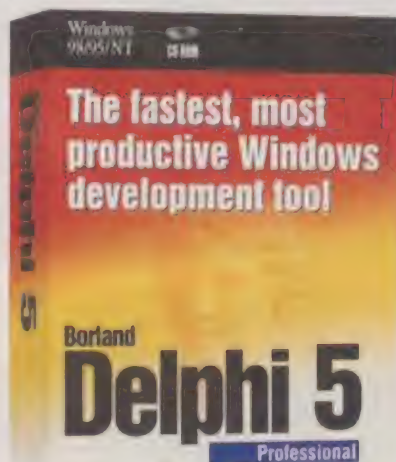
GST Ex: \$1,129 + GST: \$112.90

(98247) GST Inc: **\$1,241.90**

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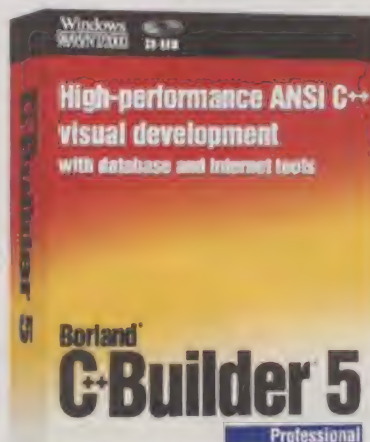
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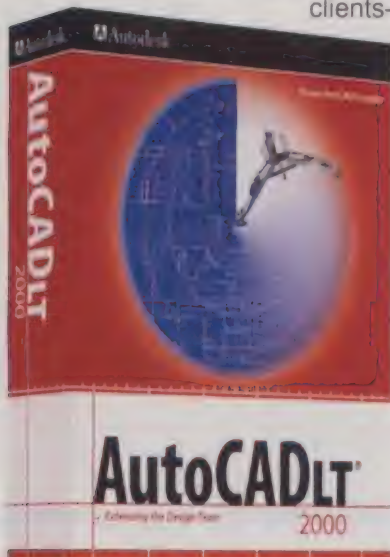
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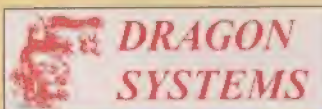
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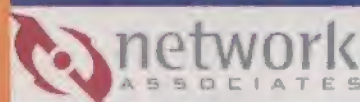
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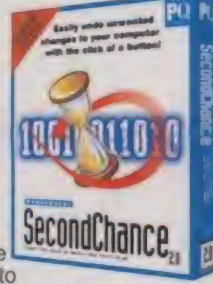
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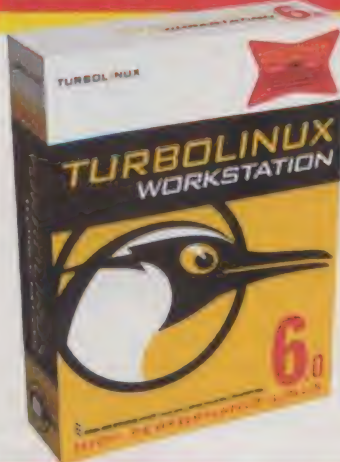
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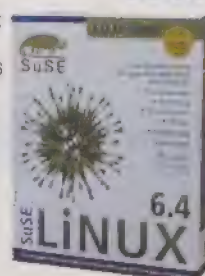
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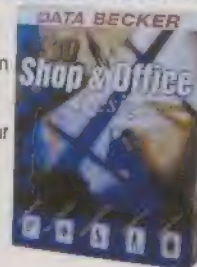
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Final Fantasy VIII

Final Fantasy VII was more of a revelation on the PlayStation than on the PC, where complex, story-line-driven role-playing games are a staple. Now, Final Fantasy VIII has made the console-to-PC hop, and it's interesting to see how the title has developed.

You play the role of Squall Leonheart. Plot is very important to this title, so we won't reveal too much. Suffice to say, there are bad guys to oppose you, beautiful maidens to rescue and lots (and lots) of computer-animated scenes to sit through. These scenes are stunning, well paced and extremely well scored, but it becomes a chore to finish an objective and then have to sit through *another* three-minute movie.

One of the strengths of Final Fantasy VII was the mixture of cut scenes and combat. Regrettably, Final Fantasy VIII has opted for more cut scenes and a much less active combat system. Instead of casting spells based on your own magical abilities, spells must be 'drawn' out of your foe. These spells can then be cast, or stored and used to upgrade your other abilities. This is good in theory, but in practice it means you sit there drawing spells from enemies and constantly defeating them, pausing every once in a while to actually hit them with a weapon just for variety.

Final Fantasy VIII has a great plot, fantastic music and attractive visuals. It's a pity that the series has become an interactive

movie with tacked-on combat rather than a full, immersive role-playing experience.

Alex Kidman

Contact	OziSoft
Phone	(02) 9317 0000
Online	http://www.eidos.com/
Price	\$79.95
Requires	Pentium 200, 32M RAM, 8M 3D accelerator
Classification	G(8+)
Rating	★★★

Majesty: Sovereign of Arдания

Real time strategy (RTS) games come and go, often adding little to an overpopulated and stagnating genre. Fortunately, Majesty from Microprose is a departure from the norm and its bag of innovations will please many gamers.

Majesty is set in a world of gnomes, trolls, dragons, zombies and other such fantasy creatures where you control and build a medieval empire. You must use your empire to complete the variety of quests that are bestowed upon you. These quests range from recovering artefacts to slaying beasts and saving the peasants from a plague, so rest assured that you'll always be kept interested.

In order to complete these missions, you need the assistance of various characters throughout the game. Unlike previous RTS games, you can't just order about the characters in Majesty at your will; they must be offered rewards. For example, in order to have a giant rat killed, you would need to place a bounty of, say, \$200 on its head in the hope that a character in the game will find it an acceptable sum to fight the rat. Mechanisms such as this add a unique and pleasing twist to Majesty.

Another interesting addition to the RTS genre is the notion of characters gaining experience and skill. All characters start at a level of 1, but as they fight more enemies they gain experience, and even-



tually become heroes. Heroes have much greater strength and endurance, and can also use special skills such as magic.

Sadly, Majesty isn't quite as polished as it could be. The 2D graphics are uninspiring and the sound is repetitive. Despite this, Microprose should be congratulated on adding a series of innovations to a stale genre.

Alan Crawford

Contact	Hasbro Interactive
Phone	(02) 9966 9899
Online	http://www.cyberlore.com/Majesty/index.htm
Price	\$89.95
Requires	Pentium 233, 64M RAM
Classification	G(8+)
Rating	★★★★

Messiah

Messiah is a 3D third person shooter with an unconventional twist. You play Bob, a

Guide to ratings

- ★ Shot-put: goes down like a rock
- ★★ Tennis: Just makes it over the net
- ★★★ Marathon: Goes the distance
- ★★★★ Butterfly: Plays just swimmingly
- ★★★★★ Archery: Right on target



two-foot tall angel with stubby wings, sent to Earth by God to 'clean up' the sinners. This of course means lots of killing and bloodshed, but without any weapons, and with only a nappy for armour, what's a cherub to do?

As Bob, you have the power to possess people and use them for your own means. Once you have possessed a character, you then assume that character onscreen. Bigger people mean longer strides, more speed and greater strength, as well as other abilities, such as weapons and computer operation.

You can be healed by Bob's 'host' and then use the body as armour until you either de-possess the character or it dies. Unlike most shooting games where you sweep into a room and mindlessly perforate anything that moves, in Messiah, you have to be careful not to kill a character you may need. After playing for a while, you become totally careless with lives, sacrificing people at a whim just to make slight gains. It's mercenary, but it's a great twist on the usual shoot 'em up.

Messiah has received bad press because of major incompatibility problems and frequent crashes due to the game engine. What Shiny have tried to do with Messiah is technically commendable. It has low minimum specification requirements to run, but the game tailors itself to whatever machine setup you're running, and then stresses it to its absolute limits. As some systems fail under the strain, we thoroughly recommend closing down *everything* when playing this game.

We played the game on a Windows 2000 system, a respectable 350MHz Pentium II, 96M of RAM and a Matrox G200 graphics card. These specs should have any self-respecting game crashing and burning from the start, but they ran Messiah flawlessly. In fact, we saw the game as it should be seen — seamless and perfect. Messiah is an excellent game on all levels.

Darren Ellis



Contact	Interplay
Phone	(02) 9959 1074
Online	http://www.messiah.com/
Price	\$89.95
Requires	Pentium II, Windows 95, 64M RAM
Classification	MA(15+)
Rating	★★★☆

Might and Magic VIII: Day of the Destroyer

New World Computing's developers are obviously proponents of the churn-and-burn game production model. New Might and Magic games (both strategy and RPG) appear with disturbing regularity — which may have something to do with the fact that NWC is not big on upgrading the



game engines. For the most part, the Might and Magic games are good; they just start to look old every third game or so.

The eighth incarnation in the RPG line could be referred to as the second mission pack for Might and Magic VI. Except for a few tweaks and all new environments, it's the same game with the same engine. That's not necessarily a bad thing — Might and Magic VI and VII were great games — but it does make Day of the Destroyer look dated.

This instalment in the series takes you to the previously unvisited continent of Jadame, a much darker land than those in earlier Might and Magic games (but still set in the same universe). It is inhabited by vampires, necromancers, minotaurs, trolls and dark elves. Indeed, most of your five party members will have descended from

Games News

- Just because the 'love bug' attracted amazing media coverage doesn't mean it was the only thing happening in the world of viruses. The venerable Quake III: Arena has also had its fair share of problems. A patch was released recently, and strangely enough, id software required all Quake III: Arena owners to download it to ensure interoperation between clients. It turns out that there was a serious security flaw in the multiplayer version of the game that allowed malicious server operators to overwrite any file on a player's system. Serious indeed. The latest patch, 1.17 can be downloaded from a multitude of sites — grab it now.
- Gathering of Developers (god), Mike Wilson's 'by developers for developers' publishing house has undergone a few small changes. Well, not that small — it has been completely bought out by Take 2 Interactive. Both parties have been quick to proclaim loudly that god will remain completely separate and independent of

the ever-growing corporate giant, but consumers seem yet to be convinced. Wilson, who will remain in charge of the company, has said that the acquisition will allow god to take on a lot more games, due to the extra resources that Take 2 will provide. As for Take 2, it got into the deal to make money, and lots of it. It will be interesting to watch just how this pans out over the coming months.

● Another thing that will be interesting to watch for in the near future is the annual glitz and glamour games show, E3. This year the most anticipated games rumored to be on show include Blizzard's Warcraft III, Bungie's Halo and Oni, Eidos and Ion Storm's Deus X and Anachronox (no sign of DaiKatana, although it will allegedly be on sale 'real soon'), god's Blair Witch: The Rustin Parr Investigation, Interplay's Baldurs Gate 2, and Westwood Studio's C&C Red Alert 2 and Renegade. We'll bring you a full run-down of the madness next month.

Gamespy

these races and classes. Despite this, the game hardly captures a gothic feel; it's still fantasy role playing.

Day of the Destroyer sticks to the tried and tested tenets that the series has followed from day one. Anyone familiar with any of the *Might and Magic*, *Wizardry* or *Eye of the Beholder* series will recognise the interface and basic structure. Like most newer RPGs, it allows full 3D movement, but it's still based on the same fundamental premises: undertake quests, kill monsters, face big-bad-guy, kill big-bad-guy. Click on a monster to attack it with the currently selected character, or press C to cast a spell.

If hack-and-slash RPGing is your thing, and you don't require the latest engine to get value for your RPG dollar, then this is the game for you. On the other hand, if you find anything less than *Unreal Tournament* to be an eyesore, or you're looking for a plot that rivals Tolkien, then give this one a miss. Wait instead for the next instalment due out at the end of this year, which will use a new engine.

Nathan Taylor

Contact	Jack of All Games
Phone	(02) 9482 3455
Online	http://www.3do.com/
Price	\$89.95
Requires	Pentium 166, Windows 95, 32M RAM
Classification	M(15+)
Rating	★★★

Risk II

Risk II is an adaptation of the classic board game of strategy and world domination. It's set in the Napoleonic days of chivalrous warfare and struggles for territory. Playing as one of 16 historical generals, you must use bold military strategies and skill to lead your armies to world domination.

But *Risk II* isn't an historical strategy game. The fictional gameplay is simple: set your armies, plan your attack, make your moves — and then a roll of the dice

decides the outcome. A tactical mind is an advantage, but luck plays a greater part. Still, this is a very addictive and enjoyable game.

Play takes place on a global map divided into six continents and 42 territories. You must divide your armies among the territories, ensuring that they are all well defended. *Risk* can be played in single-player mode against computer opponents, or with up to eight players sitting around one computer or over a network.

There are several modes of gameplay. Classic *Risk* mode is turn based, while the Same Time *Risk* mode means that players reinforce their territories, issue attacks and make tactical moves all at the same time. You can win the game in one of three ways: dominate a percentage of the world, capture enemy capitals, or complete a secret mission.

One of the best features of this game is the stereo music; you can have the Mar-seillaise booming inspirationally from your PC speakers as you lead your armies into battle. *Risk II* also features graphical depictions of the battlefields, which looks great but tends to get annoying. There is the option to turn all this off, which allows you to enjoy the challenge of the gameplay — and improves performance on slower machines.

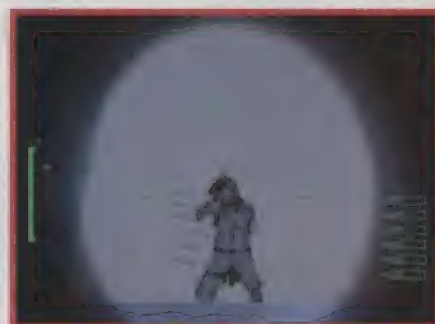
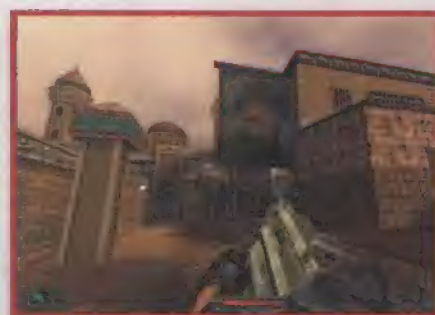
Andrew Broadhead

Contact	Hasbro Interactive
Phone	(02) 9966 9899
Online	http://www.hasbro-interactive.com/micropose/index.cfm
Price	\$69.95
Requires	Pentium 166, Windows 95, 32M RAM
Classification	G(8+)
Rating	★★★

Soldier of Fortune

In *Soldier of Fortune*, you play the role of John Mullins in the secret and deadly world of the modern gun-for-hire. The game has dozens of real-life missions which span five continents. Numerous nukes have been stolen from a stockpile in Russia, and it's up to you to recover them from around the world. As you move from country to country, the weapons change hands countless times, passing from crazed militants to terrorists.

Soldier of Fortune is built on the *Quake II* engine, but it's totally unrecognisable in this game. The designers have taken the skeleton of the engine and added their



own bits and pieces to build one of the most impressive single-player shooters I've ever played. One of the key components of the updated *Soldier of Fortune* engine is the GHOUL model-rendering engine. Not only does GHOUL produce some of the most realistic-looking characters, but it also incorporates 26 gore zones on the character models to produce the most realistic bullet wounds you've ever laid eyes on.

This is the first time this type of damage model has been used in a shooter, making it extremely violent and intriguing at the same time. It also adds an eerie (yet satisfying) effect to every landed shot. A head shot may yield a nauseating red spray while a shot to the leg with a high-calibre gun may rip the limb from the torso. Gory indeed, but very impressive.

Because of the nature of this game, there is a violence lock option, but parents may decide that it's best for children to be kept away from this game altogether.

This is one of the best first person shooters APC has seen in a long time; it has everything, from realistic wounds to intriguing backgrounds and characters.

Ryan Shaw

Contact	Activision
Phone	(02) 9869 0955
Online	http://www.activision.com/
Price	\$89.95
Requires	Pentium 233, Windows 95, 64M RAM, 3D accelerator with OpenGL support
Classification	MA(15+)
Rating	★★★★



SPECIAL REPORT

The best Nintendo 64

After looking at Sony's flagship machine last month, APC is moving on to the Nintendo 64. This platform has suffered from a lack of games, but Nintendo has attempted to fight back with some truly stunning titles. The N64 particularly excels at multiplayer gaming: with four controller ports and games written to take advantage of them, only the Dreamcast comes close. Half of APC's top 10 are multiplayer games.

Mario Kart 64

Racing games are rare on the N64, and good racing games are even more so. Mario Kart sits at the top of the pile for its excellent four-player mode, variable speed settings (appealing to gamers of all skill levels), and because there's nothing that compares with pushing Mario off the road into a river of boiling lava.



Bust-A-Move 2

Yeah, we know — we said you have to own this for the PlayStation too. Well, puzzle games are few and far between on the N64, and Bust-A-Move 2 is by far the best. With the CD loading times removed, and slightly slicker visuals, you'll be busting bubbles until the wee small hours.



GoldenEye 007

Long before Half-Life, GoldenEye 007 was immersing players in a rare first person shooter with a plot. The Bond setting makes it instantly accessible to



almost anyone. GoldenEye combines a strong single-player mode with a highly configurable multiplayer deathmatch mode and weapons including paintball-sputtering shotguns.

Star Wars: Rogue Squadron

Rogue Squadron is the best of the three Star Wars games on the N64 and king of the N64 shoot 'em ups. The Star



Wars universe is well portrayed in this title. It's a difficult game, but you'll keep coming back for just one more bombing mission. Star Wars fanatics can hunt for Anakin's Naboo fighter.

WWF WrestleMania 2000

Fighting games are also rare on the N64. WrestleMania has a great four-player mode, a combat system that is easy to learn, people hitting each other with chairs, and best of all, the option to create your own wrestlers and save them onto the cartridge. If you've ever dreamed of beating up Bert Newton, for instance, now you can. Who could ask for anything more?



Mario 64

Mario 64 launched the N64, and it's still a great game. Nintendo may have thrown Banjo-Kazooie and Donkey Kong 64 into the mix since then, but Mario 64 started the whole 3D-platformer craze, and many of its innovations are still unmatched. The concept of a dinosaur-fighting, mushroom-munching plumber saving the entire universe continues to be an awful lot of fun.



games ever



The Legend of Zelda: Ocarina of Time

Shigeru Miyamoto's update of the classic Zelda RPG series spans two time zones, multiple fantasy cultures and platform gaming in one incredible package. Add subgames involving everything from archery contests, horse racing and the bizarre sport of chicken-gathering, and Zelda becomes even more fun.



It may take a little time to really get going, but it will take you months of solid work to uncover everything Zelda has to offer. And it's educational; how many kids would have known what an ocarina was before The Legend of Zelda?

Pokemon Stadium

The majority of APC staffers would rather see Pikachu and his ilk assaulted with drill bits, but Nintendo does market its stuff to children, and if you have an N64 and children, they're probably pestering you for this little number. It is a detailed strategy game where



Pokemon 'masters' pit their creatures against each other.

You can set Lizard off against Yellow Blob Thing in a part-strategy, part-cynical marketing exercise that will keep the children enthralled for as long as it takes for the next fad to take off. Pokemon Stadium looks great, even if, as a parent, you don't have the faintest clue what's going on.



Mario Party

Despite some US players managing to shred their palms with this game (see APC May, page 194), it's still a fine party game. Take one board game, drop in Mario (again!), include subgames of the style that used to be full games back in the C64 era, and shake lightly. The result is a game that will eat up your time. Who could resist feeding their friends to a giant piranha plant?



Super Smash Bros

Yet another Mario-inspired game, Super Smash Bros is a fighter with a difference. There are no KOs or fatalities here: simply knock your opponent off the side of the platform you fight on using fire flowers, baseball bats, Pokemon balls or anything else that comes to hand.



Nintendo rolls out a selection of its own characters (Mario, Donkey Kong, Link and so on) and pits them against each other in a fight to the death. It's another four-player title with a lot of replay value.

Games that nearly made it

Wave Race 64, Pilot Wings 64, Earthworm Jim 64, Star Wars: Episode 1, Racer, ClayFighter 63-1/3

Five N64 games to avoid

Cruis'n USA/Cruis'n World A couple of terrible racing games

Doom 64 How to do Doom wrong

Bio FREAKS A beat 'em up with a beaten-up control method.....→

Superman The Man of Steel becomes the Man of Ridicule

Lylat Wars A great SNES (Super Nintendo) game becomes a mediocre space shooter



Dress up your snaps, take a maths or language lesson, or spy an adventure game for kids.

Make it snappy

Adobe PhotoDeluxe 4.0 Home Edition

PhotoDeluxe 3.0 was Editor's Choice when APC examined image editors earlier this year (see APC February, page 105). Version 4.0 is also a solid performer for working on your happy snaps.

The new features are mainly Internet related, for instance, there is access to Adobe's ActiveShare Web site (to make your photos accessible to family and friends) and you can email projects directly from PhotoDeluxe. There are also additional templates, photos and other resources such as 3D models.

As in version 3.0, the installer plays a useful introductory movie. However, it also loads Acrobat Reader 4.0 (some additions are documented in PDF files) and adds four icons to the desktop without asking permission.

You can either work through the stages shown on PhotoDeluxe's toolbar (get a photo, modify it and then save, send or print it), or switch to the full ('advanced') menus. This allows you to use the interface you are most comfortable with.

The program can acquire photos from scanners, digital cameras or existing files. The Open dialog does not show thumbnail previews of images, so initially you have to rely on filenames. It's possible to create 'albums' containing thumbnails, and the sample photos on the CD-ROM are catalogued in this way.

There is still only one level of undo. This means that if you apply an effect to a selection and then deselect the area to see what the picture really looks like, you can undo the deselection, but not the effect.



There are new 3D models to incorporate your photos into. For example, you can put a photo into a frame, then position the frame in three dimensions against a chosen background.

The Web sharing works well, but we had no success with email support. The program connected to the server, but wouldn't send the file.

Even though the software makes many operations easy, it still needs a better manual.

Upgrading probably isn't worthwhile unless you want the Internet support, but Photo-Deluxe remains an excellent choice for dressing up your photographs with ease.

Stephen Withers

Contact	Adobe
Phone	1 300 550 205
Online	http://www.adobe.com/store/products/photodeluxebe.html
Price	\$149, upgrade \$70
Requires	Pentium II 233, Windows 95, 32M RAM
Rating	★★★★

I Spy Spooky Mansion

Scholastic's I Spy Spooky Mansion is an intriguingly different adventure game recommended for six to 10-year-olds. It's inspired by the popular I Spy books.

You have to work your way through a scary old house, find the 26 riddle pages and then search very detailed pictures for hidden objects. When you complete each page, you are rewarded with a puzzle piece. By putting the puzzle pieces together, you discover a secret message which allows you to escape the house. The pictures are very intricate and it's quite difficult to find some of the objects as their descriptions can be cryptic. The difficulty level increases when you have to use a magnifying glass or a torch to locate the items, or move objects around for the riddle to make sense.

The mansion includes other games, which break up the sometimes monotonous riddle pages and the slightly annoying voice of the narrator. These include matching and visual discrimination games played



against the clock, creating your own spooky riddle page and making your own ghosts in the workshop.

Features include the personalisation of scenes with the player's name, amusing animations and sound effects that act as rewards along the way, and the option to save the game at any stage.

This is a beautifully produced game. It is challenging and engrossing and deserves the awards it has received. It's a good game for two children of different ages to play together, making it ideal for a family, as most younger children would need a lot of assistance to find the hidden objects and to understand words like 'clipper' and 'kazoo'. It's educational in a very clever way; it makes reading and problem-solving fun, and rewards persistence.

Catherine Howard

Contact	Scholastic New Media
Phone	(02) 4328 3555
Online	http://www.scholastic.com.au/newmedia/
Price	\$49.95
Requires	486DX 66, Windows 95, 16M RAM
Rating	★★★★

General Mathematics 1 & 2

Are you hopeless at maths? I know I was when I was at school. If only I'd had General Mathematics 1 & 2 from Natural Learning, I'm sure Mr Brown would have stopped hitting me over the head with his answer book.

This CD is an excellent example of how to make the most of a multimedia teaching program. It uses well-linked, simple screens, doesn't go overboard with sound, and keeps to the point without extraneous animations and video clips. If it has one



fault, it's that the program runs directly from CD, making it a little slow to access some sections — but that's being picky. Everything else is very good.

The session starts with a selection screen offering a huge range of subject areas, including all those scary ones like algebra, statistics and trigonometry. These can be tackled in any order — unlike Mr Brown's strict curriculum. Each subject area takes you through the mathematical theory and some examples before consolidating your understanding with exercises. Then it's the ultimate: Challenge Questions.

These are like weekly school tests, and you are given your score automatically as you run through the questions. Once all the subject areas are completed, you can opt to sit the exam, which tests all the major maths subjects covered. It even gives a pass (or fail) grade at the end. If you fail you can reset and resit the exam, then pass with flying colours next time around.

As a learning tool, the layout is good, the menus are understandable, the theory is extremely clear and I have to say I much prefer this CD to old Brownie. There, I said it. And I'm not doing a detention either, 'cos I just passed the geometry test!

Jeremy Torr

Contact	Dataworks
Phone	(03) 9764 8344
Online	http://www.dataworks.com.au/
Price	\$79.95
Requires	Pentium, Windows 95, 16M RAM
Rating	★★★★

Smart Start French/German/Japanese

One problem with technology is that sometimes, just because it's there, you feel you have to use it. Perhaps that is why the Smart Start developers included voice recognition in their new language programs.

The concept is great: the program tells

Interactive News

- Microsoft is continuing to push interactive TV, and is all set to unveil its latest strategy to dominate this market, which is tipped to be worth around \$9 billion over the next few years. Despite the major hype of the early 1990s, interactive TV has never really taken off in the way the major corporations had hoped. However, things are really on the move again, thanks largely to gaming consoles (Sega Dreamcast, Sony PlayStation2, Nintendo's Dolphin, and Microsoft's X-Box) and their incursion into the market. Through a deal with 'The Kiss Principle', Microsoft will be launching interactive features to its TV service, including real time chat in combination with television shows; the ability to search through program listings as you would a search engine; and dynamic parental control software. All reports indicate that Microsoft will launch the X-Box and Microsoft WebTV separately, with little crossover between the two — which seems a slightly confusing strategy.
- MP3: two letters and a numeral that strike fear into the hearts of hard-

working bands everywhere, not least long-time hard rockers Metallica. They've filed a lawsuit against MP3 file database Napster and named over 335,000 users who were allegedly trading their music illegally. The users have not been named in the lawsuit, but not surprisingly the response from the band's fans has been overwhelmingly negative. The battle is really beginning to hot up as the corporations (and aging rockers) continue their fight against Napster, MP3.com, and the use of MP3s in general.

● In Australia, One.Tel has begun a campaign for wireless domination with the launch of its own GSM network. The 'boutique' mobile phone company (partly owned by Packer's PBL and News Corp) has launched the GSM network with a range of services that may mean real competition for the existing telcos. One.Tel is offering WAP services, streaming radio to mobiles (for a cost), and most impressively, WAP-like services through a smart SIM card with all its new phones.

Gareth Jones

you how a word should sound in French, Japanese or German, then you repeat the word back to the computer so that the voice recognition software can analyse your response and compare it with the original. The problem is that a close approximation can fool the computer, yet still be completely unintelligible to a native speaker.

Despite this, these programs all do a decent job of teaching you the basics of the language, and they use the conventional read and speak methods as well.

Installation and setup is very simple, and makes calibrating and identifying the microphone and speaker levels as easy as pie. However, the initial menu screen is a bit fussy and could be confusing to some first-time PC users.

Once you have delved into the the section you want, the program offers spoken, written and reading exercises. The written sections are a bit text-heavy with nary a picture to lighten them, but the oral practice sections are very well designed with lots of images and animation.

The menu offers a wide range of activities, games, learning exercises and practice scenarios, and should provide a good grounding in most languages. You can

even select the kind of voice you want to listen to — male, female or child. Just don't get carried away with the idea that because the computer recognised your request for the toilet, any Japanese person will.

There's still a way to go until a computer can recognise the difference between an f and an s in a foreign language.

Jeremy Torr

Contact	Dataflow
Phone	(02) 9420 6700
Online	http://www.dataflow.com.au/
Price	\$89.95 each
Requires	Pentium, Windows 3.1, 32M RAM
Rating	★★★



MP3 mania is stirring up audio anarchy and shaking the very foundations of the music industry. By Vanessa Richardson

The new sound system

This month APC is launching Random Notes, a section dedicated to downloadable music and the people who create it. Look out for new tracks on the cover CD every month. The first instalment features new releases from various Australian electronic acts.

Australian electronic musicians are embracing the possibilities of the Net, and MP3s in particular. Many musicians consider that major record companies have been slow to recognise the popularity of the electronic genres, and some prefer to find alternative ways to distribute their work.

John Jacobs from Organarchy believes MP3 is an opportunity for music makers and consumers to overcome the constraints of the music industry. "Some are

ripping the mainstream Robin Hood-style, while others hawk their own tracks for an honest income. Our crew is one of the many who are combining the best of both of these ideas using MP3 to give their own goods away for free. This kind of unregulated trading is rocking the foundations of corporate music empires."

Adam Pierce from the 5000 Fingers of Dr T has found that the MP3 format provides a cheap and effective way to distribute his music. "There seems to be a lot of resistance to the MP3 format at the moment because it's too easy to make copies, but being easy to copy is the number one advantage. It means people can give your music to their friends or post it on their own Web site."

Some record companies and big-name

acts have objected loudly to the existence of MP3s, and there is no doubt that they will attempt to tighten their control over the distribution of music files. However, MP3 and other music compression formats have already captured the imagination of many people, and both musicians and consumers are enjoying the benefits. A broader range of music is now finding an international audience, and musicians are gaining more direct contact with their audience and each other through the Internet.

Daniel Potts of Spinwarp predicts that once record companies take action, major MP3 sites will become awash with "mainstream, banal rubbish", but by this time many musicians will have set up their own distribution and promotion networks.

The 5000 Fingers of Dr T

The prolific 5000 Fingers of Dr T uses MP3 to distribute its tracks to a potentially huge worldwide audience. "Giving away MP3s hardly costs anything — unlike giving away CDs or cassettes — and we produce far more material than we can publish right now, so giving it away not only gives us great exposure but it gets tracks out there which would normally never see the light of day," Dr T's Adam said.

Dr T continues to work with record companies, and has had tracks released through Mushroom, Festival and Think during the past five years. "We even self-published a CD (called *Chewed Up and Spat Out*) in 1998, so we appreciate how difficult it is to get a



CD into the shops. Internet distribution of music, whether by MP3 or any other format,

is a supplement to distribution by CD. Some of our tracks will be available on CD only, some will be available as MP3 only and some will be both," Adam said.

'Elastic Scissors' and 'The Beat Squishing Factory' are on Dr T's new album *Buttsqueezer* (available through Festival on the Clan Analogue label for \$14.95). As well as seven funky dance tracks, it includes three extra tracks with video clips and some software — the blob generating program used in the videos.

Tracks

Elastic Scissors

Online

The Beat Squishing Factory

<http://www.doctort.org/>

Grey Area

Grey Area's Alex Salter sees MP3 as yet another piece of sound technology making it easier for bedroom producers to get their music heard. Alex is interested in the possibilities of the format, but he has some reservations. "I must admit that the thought of widespread online buying and selling of music fills me with as much uncertainty as it does excitement... as an artist I want as many people to hear my material, but at the same time I worry that MP3 will be just another way to copy my tracks — like Mini-Disc, which seems to be the current swap format for DJs and travellers."

Grey Area is known for its performances, especially at outdoor parties and festivals in New South Wales and Victoria. The diversity of Grey Area's music has sparked the imagination of critics; *Your Flesh* magazine described Grey Area as "the conductors of a night train through a sparkling digital landscape". Grey Area's third CD release, *para-matter*, should be available in November.

Tracks

Twisted Sister

Online

Sombré

<http://greyarea.chaos.org.au/>



Organarchy

The main ways Organarchy used to get its music heard were by performing live at free parties and distributing small runs of recycled cassettes. Setting up a MP3 site has changed all that, as Organarchy's John Jacobs explains in an article about mpfree (found on the mpfree site). "A few short weeks after the mpfree site was launched word got back that pushbike ghetto blasters were pumping out our merrie tunes at Critical Mass rides in San Francisco," John said.

The crew continues to perform live, and is participating in the Earthdream 2000 tour around central Australia. The two tracks included on this month's cover CD are from Organarchy's forthcoming *Activista* release, featuring Non Bossy Posse (for details check

<http://www.activista.cat.org.au/>). 'Free Oh Free' takes the words of Kev Carmody, "when we all fight for justice, freedom it will come", as the starting point for a thumping dance track with MLK and Rebel MC. 'Stand Up' is a dancefloor-friendly remix of 'Black Fella, White Fella' (endorsed by the original artists, the Warumpi Band). Organarchy describe it as "our soundtrack for a positive future of grassroots reconciliation".

Tracks Free Oh Free
Stand Up
Online <http://www.mpfree.cat.org.au/>



Spinwarp

Daniel Potts (Spinwarp) finds that using a computer, even without any additional equipment, is ideal for composing electronic music, and particularly drum and bass. He believes the high-quality sound of the MP3 format and the low cost of Internet distribution *should* be making big record companies anxious. "I'm surprised how slow they have been to respond to MP3 and how ineffective they've been to date," he said.

Although he acknowledges that there are threats to the future of MP3, Daniel thinks "things like Ogg Vorbis and Gnutella will arise to address the specific legal constraints, such as licensing and distribution issues. Music and audio are



simply experiencing the technological upheaval that printed material has undergone and which video will be next to witness. I think that while MP3 is getting all the attention, video is really the next frontier for high-compression and low-bandwidth delivery."

Spinwarp uses MP3 and video, including live video samples, in performances. There is a wide range of MP3 tracks available on the Spinwarp Web site, along with drum and bass news and information on production techniques.

Tracks The Dantian
The Awakening
Online <http://spinwarp.com/>

Synetik

For Dave Mason (Synetik), making a Web site to distribute his music as MP3s follows on naturally from using computer



technologies to create his music. He has been programming computers since primary school and now works as a network administrator.

Dave writes drum and bass tracks in his studio on the Gold Coast, but he has gained wide exposure for his music by distributing it on the Net. "MP3 allows us to build Web sites that act as portfolios, available to anyone, anywhere, anytime. If a label, film producer or promoter is interested in doing business, they can hear our music straight away. We can also build a fan base around the globe at little to no cost. The Internet and MP3 files have meant I have had my tracks played on radio and on TV (*Alchemy* on SBS)."

Although Dave puts all his tracks on the Net, he appreciates that established

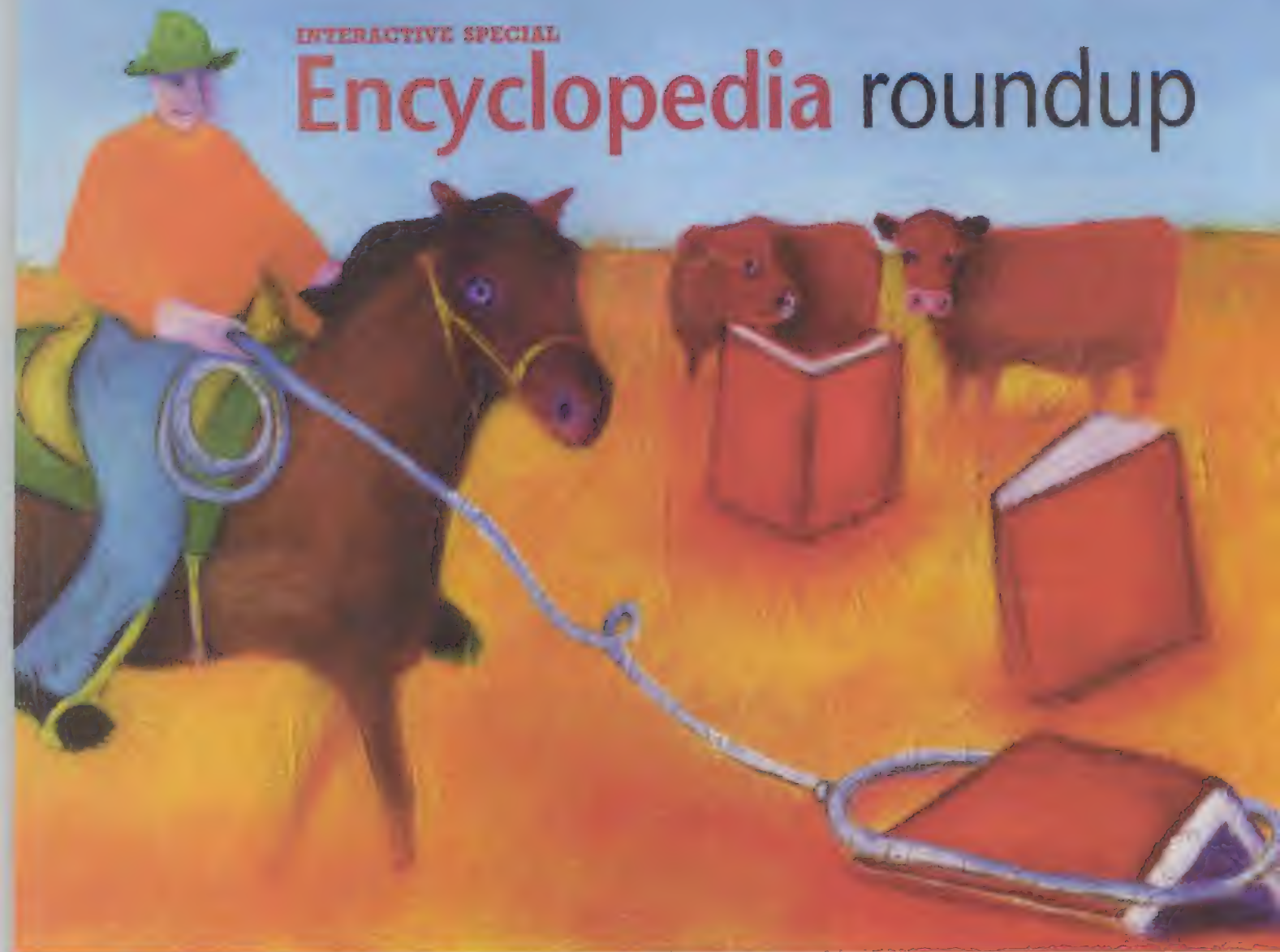
artists may have more to gain by limiting free Net releases to a couple of tracks from their albums or some remixes of singles, in order to promote the CDs they are trying to sell.

Dave runs the Voodooobreaks label, which is soon to release a compilation called *Global Rinseout*, consisting of the winning tracks from a competition between drum and bass producers. Voting runs until June 30 (on <http://users.bigpond.com/synetik/vote/>). 'Bounty Hunter Chase' and 'Biotechnology' are from Synetik's album *The Inner Workings*.

Tracks Bounty Hunter Chase
Biotechnology
Online <http://users.bigpond.com/synetik/>

INTERACTIVE SPECIAL

Encyclopedia roundup



It wasn't so long ago that well-off households would purchase racks of encyclopedias for their youngsters, in the hope of ensuring a good education for them. After all, that nice person selling them door to door had told them it would. The idea of using a general reference work to supplement educational aims is still a solid one, and you no longer have to store half a tree on a bookshelf to do so. **Alex Kidman** rounds up the latest CD-ROM encyclopedias.

An encyclopedia should not only be easy to search (and most of them are), but it should also be as comprehensive and up to date as possible. It's hard to assess a reference work without some guidelines. APC chose six topics at random, and set out to research them using four different CD-ROM encyclopedias.

We wanted to test not only the availability of content, but also its relevance, timeliness and ease of access. A good CD-

ROM encyclopedia should also offer contextually similar topics as an aid to research.

Our test topics were designed to stretch the average encyclopedia. They were: the Belgian artist Hergé, LSD, Wagga Wagga, Salman Rushdie, the artist formerly known as Prince and, finally, the Internet.

Another feature of CD-ROM encyclopedias is a mass of extra content, from virtual tours of places of interest to step-

by-step histories of just about anything. Like most sections of an encyclopedia, these are often worthless until you need the information in question, but they are a selling point — some people feel safe in the knowledge that a history of the Tudor monarchs can be at their fingertips within seconds if the need arises.

Reviews of Webster's Encyclopedia of Australia and World Book 2000 can be found on apcmag.com.

Compton's Encyclopedia 2000 Deluxe

Like Webster's World Encyclopedia, Compton's Encyclopedia 2000 Deluxe has an accompanying book. Unlike World Encyclopedia, Compton's *Handy Science Answers* is not the size of a whale. The package contains a two-CD set, along with two years' worth of *National Geographic* issues on a separate CD-ROM (to promote the complete National Geographic CD-ROM set).

Compton's design is impressive. It has quick searches, simple pop-up definitions followed by more in-depth articles, and the usual mix of video, sound and special features including an atlas and dictionary.

Most of the special features are stored on the second CD, but the basic content is all on the first CD. This means that Compton's was the only multiple-CD encyclopedia that didn't require constant CD swapping.

Despite the good design, the content really doesn't stack up. It is extremely US-



focused. The timeline, for example, has a 'world' and 'US' section. Far more problematic is the lack of Australian content. Our searches produced a blank for Hergé, a small section for Prince, and suggested that maybe we meant 'wagon' when we typed in 'Wagga Wagga'. There were listings for some of the test topics, but most of them were short and often inaccurate —

Salman Rushdie qualified for a small section of biographical detail, and the section on the Internet was lengthy but insisted that people require an 'Internet Address' to communicate. Maybe this means email address. Maybe it means IP address. Who knows?

For a low-price encyclopedia, Compton's has very high quality extras, including an atlas and a planetarium.

Compton's Encyclopedia 2000 Deluxe has a good interface, but it falls well behind the other encyclopedias in terms of content, particularly when it comes to local content.

Contact	Roadshow
Phone	(02) 9552 8700
Online	http://www.broderbund.com/
Price	\$69.95
In short	Great interface, but poor content.

Encyclopaedia Britannica Deluxe

Without a doubt, Encyclopaedia Britannica is the most famous print encyclopedia. For the most part, the CD-ROM version of its product demonstrates the same high quality as the paper version.

Something APC noticed very early when evaluating Britannica Deluxe was the amount of CD swapping necessary. Most of the picture and video files are on one CD, and the text is on another. If you want a close-up of a picture in a text article, you have to swap CDs, which quickly becomes tiresome. Britannica is also available on DVD, and APC recommends this version if you have a DVD drive.

In terms of content, Britannica did very well. It has articles on Hergé, a lot of LSD information, entries on Wagga Wagga, Salman Rushdie and Prince, as well as a good Internet section. However, some searches were very difficult; for example, it took a lot of lower-level searching to sepa-



rate Prince from royalty. More importantly, some of the content was out of date. The entry for Salman Rushdie had no mention of his last two novels, and the entry on Wagga Wagga still listed the Riverina College (now a campus of Charles Sturt University).

Britannica is definitely content-rich, and most articles are written in straight-

forward prose, which broadens its reach from very young students all the way up to some university level studies.

In addition to the usual fare, the Deluxe pack has a plethora of statistical tools for global and time-based comparisons, as well as spotlight tours of the encyclopedia on topics ranging from time to roller-coasters.

Britannica has a good interface and some great content, but searching is fiddly. If it were fully up to date, it would lead the pack. It is one of the more expensive products we looked at, but you get a lot for your money.

Contact	Roadshow
Phone	(02) 9552 8700
Online	http://www.britannica.com/
Price	\$199
In short	A classy encyclopedia with some content problems.

Microsoft Encarta Reference Suite 2000

Like the Britannica, Encarta has a variety of options, in terms of content (standard or deluxe) and format (CD or DVD). The CDs do not have to be swapped as often as with Britannica, but Encarta has a tendency to crash back to the desktop, especially during text copying.

Encarta and Britannica have similar content, as you might expect from encyclopedias that cost the same amount. Britannica's content is more detailed, but Encarta has better interactive elements and multimedia presentations, which means it communicates some ideas more effectively. Searches were extremely fast and had good contextual links. All of APC's search terms produced good results, particularly in the Internet section, which launched a separate tour. The program's attempt to pronounce Wagga Wagga (wag-a wag-a) was hilarious, and had several APC staffers (including one native-born



Wagga son) in stitches. Better audio was to be found in the Salman Rushdie entry, where a passage from *Midnight's Child* can be played.

Encarta trumps the competition with its four CDs: the encyclopedia itself, the World English Dictionary and Interactive World Atlas. Unlike the dictionaries included in the other encyclopedias

reviewed, the World English Dictionary requires a complete separate install.

Encarta also comes bundled with some specific multimedia content, the best of which are the interactive tours of places such as Alcatraz and Mount Everest.

Encarta is certainly flashy, and although its content isn't as richly detailed as Britannica's, it is easier to read and is up to date. Encarta and Britannica are very similar, but being up to date is just enough to put Encarta over the line.

Contact	Microsoft
Phone	13 20 58
Online	http://www.encarta.com/
Price	\$199
In short	A detailed work with some stability issues, but it's still top of the heap.

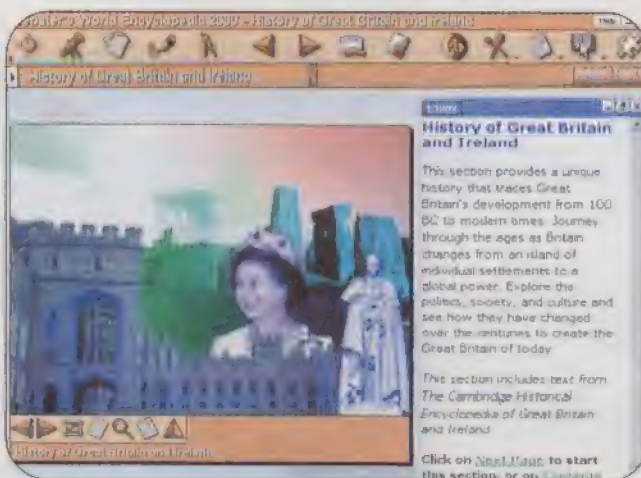
Webster's World Encyclopedia

Bundling a small CD-ROM with a history reference book seems a little odd, but Webster's World Encyclopedia is available with the optional World 2000, which costs an extra \$40.

World 2000 is also huge — about the size of an encyclopedia volume. It makes a reasonable almanac-style reference, but it also highlights some deficiencies in the CD-ROM. For instance, the book's coverage of the 20th century is more detailed than the coverage available in the CD-ROM.

Webster's World Encyclopedia performed about as well as can be expected for a low-cost encyclopedia. The search controls are bright and quick to respond, and easy to pick up for new users.

APC's specific searches highlighted both the strengths and weaknesses of the product. It has little on Hergé, plenty on LSD and Wagga Wagga, a reasonable amount on Prince and the Internet, but nothing at all on Salman Rushdie. What content it does have is generally presented



in light prose, which is good for comprehension but not necessarily as detailed as some people might require. Like the companion Encyclopedia of Australia, the content level is aimed at primary and early high school students.

The World Encyclopedia is strong in some content areas. Its history of the UK and Ireland, for example, ranges from 100BC to modern times, which is useful for

quite a few research tasks. There are also a few topic areas that seem to fall into 'it seemed like a good idea at the time' territory. For example, there's a foreign phrase translator, but it only has 11 phrases to learn.

Included on a second CD are a group of generic themes and a Webster-specific browser, but it's unlikely that anyone would change browsers to match an encyclopedia interface.

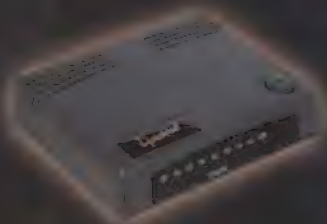
The World Encyclopedia is a little weak compared to its better-known counterparts, and unlike Webster's Encyclopedia of Australia (see review on apcmag.com), it doesn't stand out for unique content.

Contact	Scholastic New Media
Phone	(02) 4328 3555
Online	http://www.websterpublishing.com/
Price	\$49.95, \$89.95 with book
In short	Let down by its lack of international content.

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For last-minute GST compliance information, turn to your personal tax advisor — the Web.

Taxing times

GST Start-Up Assistance
Office

The Federal Government set aside \$500 million to help small to medium-sized businesses, educational organisations and the community make the transition to the GST. Established to administer these funds, the GST Start-Up Assistance Office (GSAO) has developed three educational programs to help these sectors adjust their business practices in accordance with the new tax regime.

Organisational Delivered Assistance involves industry bodies providing industry-specific information about the GST; Business Skills Education centres around a KPMG guide to the impact of GST on business and what companies need to do to prepare for July 1; and Advisor Education is a series of national seminars to train people to provide informal GST advice.



The GSAO Web site provides information on these initiatives including contact details, Q&As, fact sheets and guides. These can be downloaded in either Word or PDF form. Although it's a good support resource for the GSAO program, the site is really only a starting point — those who want more information will have to go offline to find it.

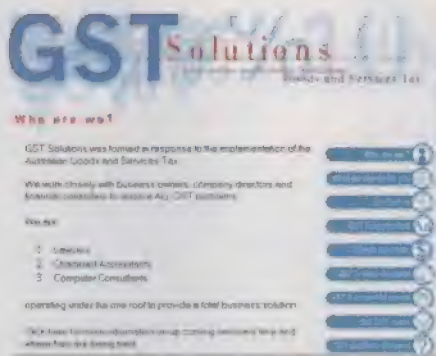
Cosimer Marriner

Online <http://www.gststartup.gov.au/>

Rating ★★

GST Solutions

GST Solutions is the definitive online resource for business people who need to get a handle on the new tax system.



The site was developed by the Quinn Group, a team of lawyers, chartered accountants and IT consultants. It was formed in response to the Coalition's tax reform package.

Geared towards the corporate sector, GST Solutions offers practical information on how to solve your GST-related problems. It covers all aspects of the new tax — legal requirements, accounting procedures and computer/IT issues — and then some.

The GSI timetable and 'latest developments' page are particularly useful references. There is too much information to absorb in a short time frame, so choose the sections that are most relevant to you now and come back to the site later for more background reading.

Vanessa Fazzino

Online <http://www.gstsolutions.com.au/index.html>

Rating ★★★★★

Tax Reform Debate Index

This index is part of the Australian Council for Social Services (ACOSS) Web site. It's a little misleading to refer to the index's content as a tax reform debate — it only represents the views of one interest group, albeit a very important one.

The page contains ACOSS media releases on the impact of the GST and its assessment of the major political parties' policies on the issue. It also includes ACOSS's submissions to the GST Senate inquiry.

What sets this site apart from others on the new tax is that it looks at a different side of the GST: the social cost. While most sites are accounting oriented, ACOSS deals with

how the GST will affect the poor rather than whether or not you should postpone buying that luxury car until July 1.

Gail Lipscombe

Online <http://www.acoss.org.au/taxreform/index.htm>

Rating ★★★★★

Tax Reform

The official ATO tax reform site shows people of all ages, ethnic backgrounds and professions with cheesy grins on their faces, because everyone loves tax . . . don't we?

Click on the picture appropriate to you
— individual, business or tax practitioner
— for advice on how the GST, new income
tax rates and other changes will affect you.

Businesses should use this site as a starting point for GST preparations; the links here will lead you in the right direction. The busiest section is the tax practitioner area — it's regularly updated with the latest instructions to accountants and tax professionals.

There is some useful information here, but it comes to you through the lenses of Mr Howard's rose-tinted spectacles. Words like 'better', 'fairer' and 'equal' abound.

Simon Vandore

Online <http://www.taxreform.ato.gov.au/>

Rating ★★★★★

The Age

The GST hasn't escaped the ever-watchful eye of the media. For another take on tax reform check out the GST news archive at *The Age's* site. The articles go back to



January this year; anything written prior to this date can be obtained from Fairfax's Info Archive for a fee.

The Age's news coverage is dominated by the infamous 'tampon tax' — evidence of the media's usual political muckraking ('How Tanya Tampon forced Howard to leave in a hurry') and social propagandising ('Believe me on GST: says Howard'). If you'd like to add yet another voice to the inexhaustible tax reform debate, join the online discussion forum.

For a national, business-oriented perspective, the *Australian Financial Review's* GST Index (at <http://www.afr.com.au/gst/index.html>) is highly recommended. News articles are available from October 1999, and unlike those from *The Age*, are free of charge.

Vanessa Fazzino

Online <http://www.theage.com.au/issues/gst/index.html>

Rating ★★★

Income Tax Calculator

Tax calculators such as this one, from banking services provider Bankchoice, are a dime a dozen on the Internet (which is why we have not given it a rating). Enter your annual income in the

applet provided and it will automatically calculate your net income and the tax payable pre and post GST, as well as the tax differential.

Vanessa Fazzino

Online <http://www.mfxts.com.au/bankchoice/>

Rating Not rated

Australia's GST Resource Site

If you run a small to medium-sized business and want information about the GST, then this is as good a place as any to start looking.

Surfbaud: 'Cause I'm GST, I'm dynamite!

Generally, people are sceptical about the effectiveness of email petitions. However, the petition opposing the GST on tampons is the first clear example of the political influence of the Internet in Australia. This was not the first time an electronic petition had been tabled in an Australian parliament, but it is remarkable for its origin and the speed at which it spread.

The petition was composed by Sydney-based writer Margaret Morgan in late December 1999, posted on a forum for mothers called MotherChild, and sent to a number of email lists she was on. The Women's Electoral Lobby (WEL) soon picked up on the petition and began a campaign on the issue, and several ALP Senators got on the bandwagon, posting the petition as a form on their Web sites. The email spread almost as fast as the 'love bug' virus, and by the middle of January, opposition Senator John Faulkner reported receiving more than 3,500 signatures within a week. Senator Faulkner tabled the petition in the Senate on February 15, just nine weeks after it was written. It had 10,355 signatures.

The petition opposed the application of the GST to women's sanitary products, such as tampons. Unlike sunscreen, condoms and personal lubricant, sanitary products were not exempted from the GST because they were not considered to have a public health benefit. The speed of the online campaign caught the Federal Government off guard. In an interview on ABC Radio, health minister Senator Wooldridge alleged that the campaign was not grassroots but was being conducted by tampon manufacturers.

Although the GST on tampons has not been overturned yet, the WEL expects that more petitions will be tabled during the last sitting of Parliament before the GST comes into effect. Morgan told Surfbaud that "the real success of the campaign is the recognition that the Internet is providing average people with a real voice and the ability to communicate. Unlike traditional media, which is largely a one-way stream of information, the Net allows real interaction and fast, efficient access to decision makers."

Glenn Phillips

The site is a collection of links to accountants, government bodies, media reports, lobby groups and training resources. There's not a huge selection to choose from, but there is enough to get started.

The most useful resource is the list of government sites related to the GST. These include the ACT Business Gateway, the GST Start-Up Assistance Office and state departments in several states and territories.

If you're after media coverage of the new tax system, then look no further. There are links to special GST coverage by most major financial publications including the *Australian Financial Review*, *Business Review Weekly* and *Business Sunday Online*.

William Maher

Online <http://www.gst.au.com/>

Rating ★★★

No to the GST

As a mouthpiece for the Communist Party of Australia (CPA), the 'No to the GST' site has a very strong political message. The CPA is waging an anti-GST campaign on behalf of those it claims to be the losers of the Coalition's regressive

tax regime: workers, pensioners and low-income earners.

Apart from some of its own socialist propaganda, the site also reproduces a collection of articles published in *The Guardian*, the weekly newspaper of the CPA.

While its attempt to subvert the government's tax reform agenda may not be politically correct, 'No to the GST' does provide an interesting and refreshing perspective.

Vanessa Fazzino

Online <http://www.geocities.com/CapitolHill/Senate/6059/nogst.htm>

Rating ★★★★★

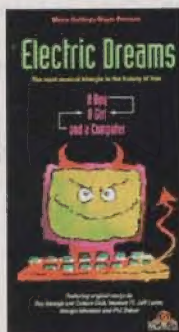


IT came from cyberspace

Way before IT was IT, Hollywood was having a romance with all things technological. Since the advent of the computer, we've had to sit through some awful dross in the name of 'entertainment'. Chip Chat revisits some of the bad IT-related movies of the past, and wishes that maybe, just maybe, some things could be repressed.

Electric Dreams

After spilling champagne on his new PC, Miles finds his machine, Edgar, suddenly exhibiting a personality. Soon after, a cute new neighbour has Edgar and Miles in a contest of hearts. It was one of the first 'whimsical' IT movies of the '80s, but the plot may no longer be so far fetched. With the sheer amount of porn available on the Internet today, lots of people might fall in love with their machines. Ahem.



The Net

It's been a long time since the digerati were slapped in the face so vehemently by Hollywood. For anyone with even the most basic knowledge of computer systems and the Internet, this movie stinks. Still, AOLers worldwide loved it and empathised strongly with Sandra Bullock's fight against the evil of the big, bad Net. They probably even stopped paying for pizza with credit cards lest they draw the attention of the Feds hovering in silent unmarked choppers above...



Hackers

Supposedly a hip youth movie, *Hackers* depicts the travails of a group of hackers up against a nameless mega-corporation. This film missed the mark on many levels without stooping to the sheer suspension of disbelief required by *The Net*. Famous scenes include the bragging-about-system-specifications foreplay and the tacky arcade/nightclub gaming contest. On the upside is Angelina Jolie and the cool equipment, but not much else. You almost expect the baddies to stamp their feet and say "We would have gotten away with it, if it wasn't for those meddling kids".



War Games

In this movie, a dork with a dinky 300-baud acoustic coupler logs onto a computer with the intention of playing computer games. He engages 'Joshua' (picture Joshua as Terminator 2's Skynet, but with only 8K of RAM) in an exciting game of Tic Tac Toe. Little does he know that he has just launched World War III. Mathew Broderick also hacks into his high school computer to change his grades, which he did again three years later in *Ferris Bueller's Day Off*.



The Lawnmower Man

This movie bears absolutely no similarity to the Stephen King story on which it is supposedly based. *The Lawnmower Man* starts with VR monkeys and quickly descends into cybersex. Jobe (the mower man) changes from a Forrest Gump-like gardener to an all-powerful god, CyberJobe, with the aid of VR programs. It's typical 'scientists creating monsters' fare, but with scary computers and the Internet thrown into the mix. Visually, it is a feast of early graphics capabilities, but is let down by a poor story-line and bad acting. Somehow, it spawned a sequel.



TRON

The first movie to even try to represent cyberspace, *TRON* almost stands the test of time. People remember the gladiatorial games, the light cycles and sheer spectacle, but how many remember the dodgy story-line? While trying to hack into his former employer's computer system, Hacker Flynn is zapped into it. Here, programs that look like their users must swear fealty to the MCP (Master Control Program). Flynn escapes, teams up with his girlfriend and tries to replace the MCP with a user-friendly version called TRON. Daggy highlights include PC parts as landmarks — Mountains of Data and I/O Tower anyone?





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